The Builder.

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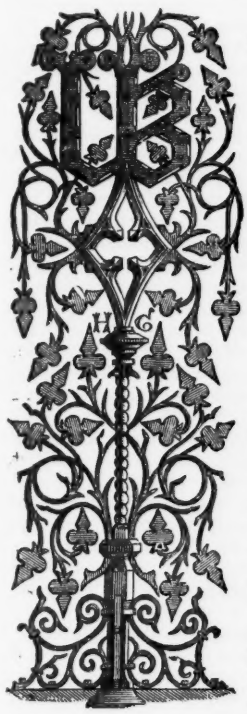
A Few Words to Wolverhampton.



WOLVERHAMPTON is particularly interesting in the union which it presents of the past and the present,—ancient relics with evidence of modern progress. We have already said how important we believe it to be to such a town to preserve the landmarks of its early history. A very good feeling in this respect seems to prevail, we were glad to see; so that exhortation is scarcely necessary. The fine old church has been restored, and the ancient cross, or pillar, seems duly prized. Several creditable buildings have been lately erected. The Town-hall, Anglo-Italian in style, with Mansard roofs of the present period, is a handsome-enough building, and seems to meet the requirements, though the acoustic qualities of the council-chamber are diabolical, and should at once receive scientific attention, with a view to improvement. A good building has been put up for the purposes of the School of Art, though it is not made use of to the extent desired; and the streets display some excellent shops. The building trade is not particularly lively in the town: one of the leading builders discharged twenty of his joiners on the morning of our visit. The fact that recently there were 20,000 miners of the neighbourhood, and 30,000 hands dependent on coal, out of work, must necessarily affect expenditure. These violent disruptions in the course of labour necessarily damage everybody.

The suburbs of Wolverhampton show some very good houses in pleasant gardens, anything but *black* country,—the fringe of green of which Lord Dartmouth spoke at a recent meeting. The Agricultural Hall is worth looking at, and it is not an unsatisfactory indication to find one of the thoroughfares designated "Art-street." Thorneycroft's statue of the Prince Consort, like most of the bronze statues in this country, is in a filthy state: not merely covered with soot, black, and reflectionless, but with a number of white splotches here and there of most disagreeable appearance. We sadly need some good preservative coating for metal. However, our present object is scarcely so much to describe the appearance of the town as to utter a protest against the system of arranging the streets which has been pursued there, and is apparently still acted on,—a system which results in the production of countless courts of the most unhealthy and objectionable character. In street after street, street after street, side by side with the house-doors, are seen narrow entrances to Court 1, Court 2, Court 3, and so on, which are filled with houses generally without any back-windows, low, ill-ventilated, and mostly overcrowded. Overcrowding, as we have often said before, means dirt, degradation, disease, and death; and here proofs of the truth of the assertion may be easily found. We visited scores of these courts, and found them in the majority of cases with middens full, stinking, confined, and deadly. In Peel-street and its neighbourhood; behind Back-lane, and in what is called Carribee Island, the condition of things is frightful: if the latter were really the settlement of a tribe of wild Indians, it would be an object of wonder to the civilised upper classes of Wolverhampton. These are the places which fight against the general salubrity of the town, and out of which will one day come some frightful epidemic to dispel the security at present indulged in, and rouse to salutary action. These words are written with but one end in view,—the promotion of the general good,—and will, we trust, be received in the same spirit. If little else can be done, the authorities can at any rate make a resolute stand against any further extension of the abominable court system.

THE WOLVERHAMPTON CONGRESS.

THE archæological crop of the week is more than we can gather or house. Any attempt to chronicle fully the proceedings of the British Archæological Association, the Archæological Institute, the Kent, Bedford, and Sussex Society (all which, to name no others, have been industriously at work), would fill our present Number. The Congress of the British Archæological Association has been particularly satisfactory, and would give many points for notice. We must content ourselves with quotations from two or three of the papers read. We take the first from a memoir by Mr. J. C. Tildesley, on

The Early Industries of Staffordshire.

Locks.—The lock trade was a recognised industry in Wolverhampton and Willenhall at the commencement of the sixteenth century. During Elizabeth's reign, one Mark Scaliot is said to have constructed a lock "consisting of eleven pieces of iron, steel, and brass, all of which, with a piped key, weighed only two grains of gold." Early in the seventeenth century curious locks were made in Wolverhampton for "bridles for brawling women." It is satisfactory to report that this branch of the lock trade is now entirely extinct. Dr. Plot, writing in 1686, says of Wolverhampton:—"The greatest excellency of the blacksmith profession lies in their making of locks, wherein the artizans of Wolverhampton seem to be preferred to all others. . . . . These locks they make either with iron or brass boxes, so curiously polished, and with keys so finely wrought, that 'tis not reasonable to suppose they were ever exceeded except by Tubal Cain, the inspired artificer in brass and iron. . . . . I was told of a very fine lock made in this town, sold for 20*l.*, that had a set of chimes in it that could go at any hour the master should think fit." The object of chimes in a lock, unless it be to soften the heart of a burglar, does not appear; but such music is certainly to be preferred to that of the lock on the wardrobe of fair Penelope, immortalised in Homer's verse (Odyssey 21st). Pope thus translates the passage:—

> "A brazen key she held, the handle turn'd,
> With steel and polish'd ivory adorn'd;
> The bolt, obedient to the silken string,
> Forsakes the staple as she pulls the ring;
> The words respondent to the key turn round,
> The bars fly back, the flying valves resound;
> *Loud as a bull makes hill and valley ring,*
> *So roar'd the lock when it released the spring.*"

Up to the end of the seventeenth century keys were usually ornamented by the insertion of a cross in the bow, and beads surrounded the shank.

Dr. Wilkes, of Willenhall, writing in 1750, pays a flattering tribute to the skill of the locksmiths both in Wolverhampton and Willenhall. Referring to the latter town, he mentions that in the year 1776 one James Lees made a lock and key, the total weight of which did not exceed that of a silver twopence. The first of Chubb's well-known patents was obtained in the year 1818, a factory on a small scale having been established in Wolverhampton some years previously by the founder of the firm.

Wrought Nails.—Nail-making is mentioned as a thriving industry in Staffordshire, by Leland, in his "Itinerary" (A.D. 1538); and Dr. Plot, in 1686, remarks that "for nail-making there are so prodigious numbers here, that in the parish of Sedgley there are thought to be no less than 2,000 of the trade, reckoning boys as well as men." Hutton, the Birmingham historian, riding on his gray nag through the nailing district, ingenuously records his surprise "at the number of female blacksmiths here about," until a buxom lass, leaning with bare arms over her smithy door, explained that they were nailers. Shaw says, that in 1798 nail-forging employed one-fourth of the population of Tipton. Until the introduction of steam machinery, nail-forging was a thriving industry, but since that era it has been gradually drooping under the weight of enormous competition, and its existence has only been prolonged at the cost of excessive labour on the part of men, women, and even children. It is most probable that the thousands of little nail smithies scattered throughout the district of which Dudley is the centre, will, in a few years, become the relics of a decayed and obsolete handicraft.

Iron Castings.—Ironfoundries were in operation in Staffordshire prior to the reign of Elizabeth, but the produce was on a small scale until after the close of the sixteenth century. Dud Dudley made "all sorts of cast-iron wares, as brewing cisterns, pots, mortars, &c.;" and during the civil wars, cannon balls were cast at Foley's foundry, in Wolverhampton. Tipton, Bilston, Wednesbury, and West Bromwich were also among the earliest centres of the trade. The productions were, until the beginning of the present century, mostly confined to the heavier descriptions of castings, such as grates, boilers, pipes, and garden rolls. With the invention of cast hollowware in 1779, by Jonathan Taylor, a Birmingham artizan, ironfounding in Staffordshire began to make strides of progress. The first hollowware foundry was established at West Bromwich in 1780, on a site which afforded ample water power. The manufacture was of the crudest and most primitive type until the present century had commenced. The annealing oven was invented in 1805, by Mr. Kendrick, of West Bromwich; and in 1839 Messrs. T. & C. Clark, of Wolverhampton, invented the process of enamelling hollowware now so generally employed.

Mr. Molyneux, F.G.S., in a paper on—

The Roman Roads of Staffordshire,

said, these are pretty well known to be three,—Watling, Icknield, and Ryknield. The first entered the county from Shropshire, due east, at a place called Storyford. It passed near Stretton and Penkridge, leaving the latter place two miles to the north. It crossed Cannock-chase, and at Nuckley Manor diverged slightly to the south-east, and so on to the wall—Etocetum. Thence it again diverged, and left Staffordshire over the river Tame at Fazeley. Icknield-street entered Staffordshire through Warwickshire, due north. It passed across Sutton Park, which was now in a state of nature. There it would be found to represent one of the most perfect portions of a Roman road to be found in this country. The author particularly noticed that in Sutton Park, on the north side, there was a footway, about 6 ft. wide, evidently intended for pedestrians, and that on the side of the hill, midway in the park, there was a curious hollow excavation in the road, 12 ft. square, which was apparently intended as a place for watering the horses while the troops were on the march. From the ground of Little Aston Park Icknield likewise went on to Etocetum, and ultimately entered Derbyshire over the Dove, on Monk's Bridge. Ryknield entered Staffordshire across the Trent, in the parish of Burton, and was stated by Dr. Mason, in his history of Stoke-upon-Trent, to correspond to Chesterton, near Newcastle-under-Lyne, which the doctor identified as the Mediolanum of the Romans. There was some doubt whether this or another Roman road was the Roman street in question, because there were traces of a Roman road which crossed the Trent at Branston, the Ad Trivonam of the Romans, and that extended in the direction of Needwood Forest, where Roman remains had been found. After showing that the Roman roads were generally from 40 ft. to 60 ft. wide, and invariably ran across the country in a perfectly straight course, whatever might be the obstructions, the road-makers always using deposits of gravel wherever they could find them, and keeping ditches on both sides, for drainage purposes; Mr. Molyneux reminded his hearers that the Latin conquerors erected important stations

generally at twelve miles' distance, or a day's march.

Early Documents,

in the possession of Lord Wrottesley, were commented on by Mr. W. de Gray Birch, who spoke first of the great destruction of early documents that had occurred. He could tell how the beautiful miniatures and illuminations in the library at Durham Cathedral were cut from priceless manuscripts by a nursemaid of one of the members of the Chapter to amuse some fractions children;—how at Malmesbury Abbey, in Wiltshire, enough vellum MSS. were carted away from the library to serve the glovers of the town for ten years. But these, and innumerable instances, must be allowed to plead their eloquent tale to them and to posterity, and teach them to guard with jealous hand the little yet remaining, which must have been preserved by little short of miraculous intervention. One of the great values to be attached to ecclesiastical and religious deeds was, that they contained notices of national events not to be found in any other repertories. Of this Lord Wrottesley's collection contained a very notable instance, where, in a roll which he had no hesitation in ascribing to the authorship of a literary member of the Abbey of Burton-on-Trent, in the county of Stafford, a statement of the settlement of Scottish affairs in the troubled times of Edward I. had been inserted by the scribe upon the back of what really was a synopsis of British history from the earliest period to the last decade of the thirteenth century. It was evident that the Wrottesley manuscripts were exceedingly valuable as containing much that would cast a new light upon the history, manners, and customs of England during a very extended period. The following were among some of the documents which Mr. Birch produced and explained:—1. A copy, made in the time of Henry VI. or thereabout, of a deed purporting to be dated in 1088, whereby Robert de Stafford, an ancient member of the House of Wrottesley, grants a certain land called "Wrotteslea and Lemintona" to the Abbey of Evesham, in frankalmoigne, or as a free almsgiving. In consideration of this he was probably admitted into the monastery as a monk, for the deed goes on to say, "I, Robert, having been made a monk in my infirmity, in the same monastery, have confirmed this gift by the sign of the cross with my own hands." Then follows his cross or mark, as well as those of his son Nicholas, and other witnesses. There were several points about this charter of donation which the author confessed he did not like, for it appeared to him to point to the fact that the venerable monks of Evesham, having persuaded the grantor to join their community when on his deathbed, as they thought, fabricated this deed in order to get possession of the estate. Mr. Birch based his opinion adverse to the strictly genuine nature of this document upon the defective grammatical structure of the sentences, and especially upon the fact that Peter, Bishop of Chester, who, it was stated in the document, ordered the deed to be drawn up, died three years before the date of the deed.

The reception at Patshull by the president, Lord Dartmouth, and the Countess,—a reception equally genial and elegant,—on which same day Mr. Planché and Mr. Harrison Ainsworth contributed valuable papers; the continuous labour of Mr. Gordon Hills and Mr. Edward Roberts, as officers of the society, in describing and commenting on buildings not illustrated by their natural protectors; the exertions of Mr. G. R. Wright in the arranging of excursions; and the brilliant *conversazione* given in the town-hall by the Mayor of Wolverhampton as the wind-up of the week, all call for warmest acknowledgment in even the briefest record of the proceedings. We will add two supernumerary lines to give a word of hearty commendation to the Star and Garter Royal Hotel, which is kept by one bearing a name held in much esteem by archæologists,—Britton.

What is an Inch of Rain.—An English acre consists of 6,272,640 square inches; and an inch deep of rain on an acre yields 6,272,640 cubic inches of water, which, at 277,274 cubic inches to the gallon, makes 22,622·5 gallons; and as a gallon of distilled water weighs 10 lb., the rainfall on an acre is 226,225 lb. avoirdupois. As 2,240 lb. are a ton, an inch deep of rain weighs 100,933 tons, or nearly 101 tons per acre. For every 100th of an inch a ton of water falls per acre.

REPORT OF THE JOINT COMMITTEE OF THE TWO HOUSES OF PARLIAMENT ON RAILWAY AMALGAMATION.

Early in the present session of Parliament a joint committee of peers and commoners was appointed to investigate the subject of railway amalgamation.

Joint committees, special committees, Royal commissions—such are our substitutes for the special discharge of scientific or political duties by trained men. The French revolutionary mode of sending a civilian deputy to control the operations of a military command, the sole qualification of the deputy being his republican virulence, is only one step beyond our own method. Professedly and habitually we subordinate all special studies—war, marine, everything but law—to non-professional control. We have another instance of the folly of this method of dealing with questions of national welfare, on the basis of party combination, in the history of our railway legislation. The Report before us at once shows how far we are fettered and cramped by the manner in which we have made laws about railways for some forty-four years, and contributes another stone to the pile of our embarrassment.

We are not to be understood as denying that much sound sense and patient inquiry are displayed by the framers of the Report, and that much valuable information is contained in its columns. As much as that may be predicated of many similar productions. But the mischief is, that most of the time of such commissions is occupied by the education of the commissioners. They collect a mass of facts, in the course of eliciting which they acquire, often for the first time, a second-hand acquaintance with the subject, such as to enable them to speak of it in Parliament or elsewhere, or to write upon it, in a manner that may seem creditable to persons less informed than themselves. But for the main points to be grasped and followed out—for time to be saved, irrelevant evidence checked or repressed, or any assurance to be obtained that a subject has been exhaustively treated, we must look to some other method of inquiry.

We shall see that this view is signally illustrated by the Report now under consideration. It has all the mixed character of that patchwork which invariably results from setting several men to do the work of one. With many of its conclusions we fully agree. Of the feebleness displayed in altogether blinking the main question, which a statesman, if such should arise among us, will one day have to face, we had better not express our opinion. But as to the actual omission of one of the main subjects of consideration, which, from the committees' own point of view, ought to have been brought into most prominent relief, we are sure of public assent to our condemnation, when the gap is once pointed out. This we will endeavour to do.

The upshot of all the work of the commission is contained in twenty-five paragraphs, the essence or gist of which is abstracted by the report. The committee acknowledge that they suggest nothing that will "have the effect of preventing the growth of railway monopoly"; the dangerous nature of which, however, they do not dispute. Nor do they offer any suggestion by way of benefiting the public, in the way of reduction of rates and fares, in the event of the increased prosperity of the great inland carrying corporations. They propose to give such support as is practicable (or as has occurred to them as practicable, which is a very different matter) to water-carriage, inland or seaborne, and to let the public know, more distinctly than at present, what they are charged, and why they are charged, while giving them improved means for getting unfair charges remedied. These two objects are real and important. But it is inconceivable how, in going even thus far, the committee should have entirely closed their eyes, or at least their mouths, as to one of the recent developments of a very old mechanical application, which promises to be of far more general application than any method of water-carriage. To hold railway companies in check by aiding the development of canals may be all very well. But have the committee never heard of such things as tramways? Have they no knowledge of light railways or narrow-gauge railways? If they know nothing of what is doing in these things, what is the character of their intelligence? If they know anything, and have not sought either to know more, or to tell their constituents what they do know, what are we to think of their judgment? It is clear that between the rigid horns of this dilemma the Report, so far from assuming the dignity of a State paper, sinks to a value but little above that of a schoolboy's theme,—a good theme, by a clever schoolboy,—but by one who has not borne in mind the axiom that the whole is equal to the sum of its parts.

As to the short-sighted character of the policy which has allowed our great canal property to fall to so great an extent into the power of the competing railway interest, no judicious mind can entertain any doubt. The history of civilization, so far as the means of internal communication are regarded, has witnessed the same sort of oscillation between the conduct of traffic by land and by water, that we are now watching between the predominance of the attack, or of the defence, in military and naval artillery and fortification.

At one period the chief centres of commerce are those that lie most seaward, and thus give the longest land, and the shortest water, transit. Such a port was Brundusium, at a time when the military roads of the Romans afforded a surer and better mode of military and commercial transit than did the marine of the period. Such a port is that Imperial harbour, under its present name of Brindisi, again becoming. We must say this, however, as a matter of faith rather than of fact, as far as the postal service is concerned, for letters landed at Brindisi by the Indian mails still take the greater part of a week to reach London. Thus, for example, we may cite the fact that the *Poonah* landed at Brindisi, on the evening of the 1st of August, the letters which were delivered at London on the 7th. That, however, is a question of the bad management of the Italian service, and the wilful delay which the French invariably oppose to anything that does not go by Marseilles. The fact of the possible superiority of the land route remains.

On the other hand, such a city as Bristol, and we may even add, London, owes the foundation of its prosperity to directly the opposite influence. In the choice of the sites of these cities, as of most of those of which we can trace the primitive foundation, the object was to allow the greatest amount of water-borne traffic to be carried for the furthest possible distance inland. As we trace this alternation in the main requisites of ports and of cities, so may we understand the causes of the change, from time to time, by studying the history of locomotion. Within times not very remote, in this country, we have witnessed the formation of macadamised roads, the introduction of an organised system of inland navigation, and the origin and rapid extension of the railway system.

As, in the early days of the Stephensons, the canal interests steadily opposed the passage of Railway Bills through Parliament; so have the railway companies, when they had established their own position, endeavoured to devour and cripple the canals. Out of nearly four thousand miles of inland water communication in Great Britain, we are told that more than a third is now under the control of railway companies. In some instances that control might have been wisely exerted, to the relief of the plethora of the choked lines, and to the increasing of the dividend of the proprietors, by facilitating the use of a cheap mode of transport for goods, in the transmission of which time was not an object of the first importance. Indeed, even as to time, we can remember that it is not so very long since, on the North-Western line, we were told that heavy goods could be sent to London from Birmingham more rapidly by canal than by railway. That of course was an entirely exceptional state of things, arising from the great pressure and block of business. But it was an instructive exception.

The mischief of allowing the water-carriage of the country to pass into the hands of the railway companies has been twofold. First, practically, it has led to the ruin of much of the canal property. We can point out, from personal knowledge, one great line, and we have no doubt that it is but one out of many, in which the works have been so neglected that the question, which cannot long be delayed, of repair or of demolition, will assume a very serious importance. We believe this policy to be as short-sighted for the railway interests as it is disastrous for those of the country. Instead of competing with the canal for the coal and other heavy traffic, which, in the instance to which we refer, could have been carried by water not only more cheaply, but with far greater public convenience, the managers of this line would have

acted far more wisely by keeping the heavy traffic in its old water-borne course, and using their line (when it was made) for passenger traffic alone. No doubt in this case it was judged more expedient to augment traffic returns than to keep an eye on the main issue of dividend. But similar political reasons are everywhere, more or less subterraneously, at work. The result is, the public are losers, the canal property is deteriorated, and ultimately the railway proprietors will find that an ugly amount has to be paid, as the result of a blind and aggressive policy.

The second evil which this artificial check upon water communication has produced has been, that it has diverted the attention of practical and scientific men from the improvement which is unquestionably possible in canal navigation. As it is, the present limit of speed is rather incidental than actual. It is not the difficulty of propulsion which keeps the barges to their slow pace, so much as the damage done to the banks of a canal by the wave caused by a rapid transit. We have travelled with the *ne plus ultra* of luxury of motion, and with a very reasonable rate of speed, on a canal, in a light boat drawn by a pony at a trot, or even at a gallop. Under these circumstances the boat rises from its usual immersion, and glides over the surface of the water. Boats may be constructed expressly for this purpose. The saving of traction that is effected by the increase of speed is one of those things which no *à priori* mechanical investigation has pointed out. But it is a known fact. It is analogous to those results which we are now obtaining, in fixed machinery, by driving a very light wire-rope at a very high speed. The limit at this moment, as we before hinted, is rather in the cost of maintenance than in the difficulty of traction. And this is one which it would not be impossible to confront, if a due share of traffic were encouraged on our inland navigations.

It is the part of wisdom never to run into extremes. On the one hand, we profess no sympathy with the engineer who saw in the rivers and streams of a country only possible feeders for canals. On the other hand we never heeded the prophecies in which the old canal worthies were wont to indulge, as to the impossibility of railways ultimately holding their own. Nor, in its turn, can we fail to condemn the murderous hug with which the latter have embraced their watery rivals. At a period which has witnessed one of the most famous triumphs of engineering skill that has been effected since the time of the Pharaohs—the canal by which French energy and perseverance has united the Red Sea and the Mediterranean,—we are not among those who hold that canals are altogether things of the past.

It is, however, palpable to the most ordinary consideration, that the possible effect of tramways and narrow-gauge railways, either as feeders of, or to some extent as competitors with, existing lines of railway, is a far more urgent and pressing question, even if not one of so much ultimate importance, than the development of water-borne carriage. We are not prejudging the question; we are not, for the moment, expressing a decided opinion on the advantages of what are called tramways. The subject is too important to be dismissed in one or two paragraphs. But we do say that a Report which only professes to palliate, and makes no attempt either to probe or to provide for future exigencies, is signally defective, in going into the question of canals, and ignoring that of tramways.

More may be said in defence of the failure of the committee to deal with the great national question of the ultimate proprietorship of the internal communications of the country. The members no doubt felt a just distrust of their own capacity for dealing with so important a subject. It is hardly one for amateur investigation: which is the form, to speak plainly, which almost all corporate or board inquiries naturally assume. Indeed, judging from the tone in which military and postal conveyance is spoken of, we think it is matter for congratulation that the committee did not contribute an additional *quota* of confusion to a subject which all European governments except our own have held to be one demanding the best attention of their statesmen. It is proposed that the fares to be paid by the War Office for the transport of troops should be *reduced* to such an amount as will give the companies a profit equal to that derived from either ordinary passenger, or excursion, traffic. This, we think, is not the light in which the subject should be viewed. It is a matter of good statesmanship to make the incidence of all taxes as little onerous as possible. In all foreign States this maxim has been borne in mind as relates to the services which the railways render to the State. Great powers are entrusted to these corporations; to be used, primarily, for the pecuniary benefit of their members. The service of the public is, or at least has been hitherto, a subordinate consideration. The rate of fares, the timing of trains, the condition of carriages, are matters on which a *laissez faire* policy has been to a great extent that of our legislation. No redress exists, in many cases, for extreme inconvenience inflicted on the public. The directors most respected are those who declare the best dividend. It is, therefore, but little to demand, in return, that railways should return to the State such a payment *in kind* as will best serve the latter at the least expense to the former. We do not see why the conveyance of troops should be regarded as a source of profit. At all events, we are disposed to maintain that, for State service, no railway company should receive more than the lowest rate of remuneration which, for its own ends, it voluntarily accepts. We may instance the coal traffic. The low rates at which minerals are borne, for competitive reasons, are notorious. To choke water carriage, coals and ore are taken at charges which differ immensely from those of passenger traffic. Now, allowance being made for the difference, if any, of the cost of the carrying stock, a ton of soldiers, which loads and unloads itself, ought to be carried by every railway company at least as cheaply as a ton of coals, which the company has to place in, and remove from, its premises or its wagons.

We have not space to go, item by item, through the joint Report. It will be seen from the above remarks how fragmentary and casual is its character; and how it entirely fails to look a great question in the face. Nor can we view with more favour its one substantive recommendation,—the appointment of a special tribunal, entitled the Railway and Canal Commission, composed of one eminent lawyer, one member who should be thoroughly acquainted with the details and practice of railway management, and one who, as no special qualification is attributed to him, is, we suppose, to be of the fashionable political colour of the day. This attempt to create brand-new authorities is not an unnatural recommendation from a committee. Most things seek to perpetuate their own likeness; but judging from past experiences, we should only have a new obstacle thrown in the way of every really efficient improvement. That which all civilised nations, except ourselves, have done, has been to give the general control of public works, and the State supervision of all things of an engineering nature, to a minister holding equal rank with the secretaries of State for war, marine, commerce, law, and the other main branches of Government. With us, what the Government does with regard to these matters is intrusted to different functionaries, not of the highest rank, independent of one another, sometimes coming into mutual collision, and, as we have recently seen, more than sometimes coming into violent collision with all that we have that is most respectable either in science or in art. It is a misfortune to a Cabinet, no less than to the country, that such should be the case. We call attention to the fact that in the sanitary measures now in course of elaboration the head of the Local Government Office has to discharge some of the functions of a minister of public works. If such a ministry were permanently and efficiently organised, the gain to the country might be great; and so long as our present plan of giving the supreme command to a civilian unacquainted with the special requirements of his department is continued, the permanent staff of the ministry would form a sort of counsel to the temporary chief, so as to prevent him from making any very extraordinary blunders; or, at all events, so as to render him palpably inexcusable for so doing. If Government interferes at all with works, ports, harbours, river purification, river navigation, roads, railways, drainage, and sanitary engineering, it can only satisfactorily do so by a harmonious execution, and by systematic action. We must have done with referring everything to special Boards, whether of trade, of works, of sanitary measures, and of railways. What we do should be done seriously, and not by rule of thumb. The question of how far Government must, and must not, interfere with public engineering questions has yet to be stated, and to be settled. We have to commence, *ab ovo*, a systematic study of the whole question; a study such as Von Moltke made of the question of defence. With this leaf taken from a very instructive lesson-book, we shall find that public time and public money will be by and by greatly economised. We should then not invite half a dozen gentlemen to quarrel for months, or even for years, on a question which the careful report of one eminent and responsible engineer would settle in the course of six, twelve, or eighteen months, but settle definitively and exhaustively. We should cease to render ourselves ridiculous by official reports, involving the extraction of coal at a temperature of 120° Fahrenheit, or the dealing with railway legislation without any reference to tramways.

LOADS AND DEFLECTIONS OF SOLID BEAMS.*

The methods which have been in use for the last twenty years for calculating the strength of iron beams, have all been more or less based on the experiments and mathematical investigations made by the late Eaton Hodgkinson; and the author of the essay before us has not been able to discover anything more reliable than the recorded results obtained by that eminent experimenter; the chief novelty about his investigations consisting in the view he takes of those results in their bearing upon the strength of beams. He finds fault with the usual methods of calculation, because they give the breaking or ultimate strength instead of what is really wanted by the practical engineer, the proof strength or the utmost load that can be put upon a beam without permanently injuring its elasticity.

In cast-iron beams, Mr. Donaldson considers that experiments show that the modulus of elasticity, whether for tension or compression, can be taken as nearly the same, when the load is not sufficient to impair the elasticity of the material; but that in beams of wrought-iron the modulus for extension is to that for compression in the proportion of 14 to 11.

Mr. Donaldson's investigations differ therefore in this point from previous ones, in taking two moduli, one for compression, and another for extension, instead of an average modulus to include both strains. This is no doubt the correct method, but it involves more complicated formulas, and it may well be questioned whether such nicety is of much practical value in determining the strength of beams, since we seldom find that any two specimens have exactly the same modulus, and therefore after all only an average value can be taken.

There is one other important point in which our author differs from his predecessors, which consists in taking the ratio of tensile and compressive stresses as widely different when proof stress or ultimate stress is under consideration. The ultimate compressive strength of cast-iron, as determined by experiments on short cylinders, is about six times the ultimate tensile strength; and on this relation the form of section of what is called the Hodgkinson cast-iron beam is based, making the metal of the bottom flange, which suffers a tensile strain six times that of the upper one which is under compression. Mr. Donaldson, however, considers that this is a wrong conclusion to draw, and that the *proof* compressive strength being only three times the *proof* tensile strength, the form of the girder should be based on this principle, and not on the ultimate or breaking strength of the metal. He takes this view of the relations of proof and ultimate stress from a table of experiments given by Hodgkinson, in the Parliamentary Report for 1849, which were made on a number of cast-iron rods 10 ft. long and 1 in. square, in which it appears that a compressive force of 25,000 lb. was all that they would bear without injury, the tensile strain being 8,000 lb., without impairing the elasticity. If we refer, however, to the record of these experiments, we find it stated that the rods were enclosed in an iron frame, which prevented their getting out of a right line; but, notwithstanding this precaution, some of the bars strained with 16 or 18 tons had become very perceptibly undulated. This might well be expected from their great length, as compared with the width, which would be of no consequence in tensile strain; but when a compressive force was applied, the resistance would vary according to

* New Formulas for the Loads and Deflections of Solid Beams and Girders. By W. Donaldson, M.A. London: Spon. 1872.

the ratio of breadth to length, the strength of very long pillars being shown by Hodgkinson's other experiments to be nearly inversely as the square of the length. It appears, therefore, to us that the experiments which Mr. Donaldson quotes are not of much value for the purpose of determining the resistance of the upper flange of loaded beams to compression, and that a proof stress for compression of one-fourth the ultimate strength is far too little to allow in beams of cast iron.

With regard to wrought iron, it is almost impossible to fix with any accuracy the average ultimate strength, whether compressive or tensile, since so very much depends on the quality and ductility of the metal, there being no exact point in good wrought iron at which crushing can be said to occur; while, on the other hand, it may generally be drawn out very considerably by a tensile force before fracture takes place. Mr. Donaldson takes as his authority some experiments of Hodgkinson's on bars 10 ft. long by 1 in. square, and from these he deduces the ratio of 3 to 2 as that of proof compressive to proof tensile stress in wrought iron. This, however, is an inference drawn from one set of experiments only, and very different results are shown by Hodgkinson in another set, on bars of larger diameter. In subjecting long bars of wrought iron to a compressive force in the direction of their length, although kept from bending by mechanical means, the same difficulty will arise as we mentioned in the case of those of cast iron, and they can only be considered as long pillars, whose strength depends on the ratio of diameter to length. For these reasons, we can hardly admit that Mr. Donaldson has proved the principle which he affirms, "that it would be wrong to use formulas with constants determined by ascertaining the experimental breaking-weights, to design beams intended to support proof and working loads."

But whatever difference of opinion there may be as to the conclusions to be drawn from experiments, there can be none as to those deduced by pure mathematical reasoning, in which Mr. Donaldson is certainly an adept, and has worked out, by means of the integral calculus, very exact formulas for finding the strength and deflection of beams in cast or wrought iron and timber. These formulas are quite independent of the results of experiments, and will be found of equal use whatever value of constants the engineer may deem it advisable to employ. It will only be those who have a good acquaintance with algebra that will be able to follow the author's arguments or to understand the application of the formulas deduced; but the following are some of the results obtained, and which will not be difficult of practical application.

In the case of solid rectangular beams of any material, let W be the load applied at the centre of the beam, w the weight per unit of length (l) of the beam itself, d the depth and b the breadth of the beam, f, f' the horizontal components of the stress per unit of area on the extreme bottom and top edges respectively actually exerted, E the modulus of elasticity in extension, E′ the modulus in compression; then the relation between the applied forces and the resistances is expressed by the equations—

$$W + \frac{l\,w}{2} = \frac{4fd^2b}{3l\left(1+\sqrt{\frac{E}{E'}}\right)}$$

or,

$$= \frac{4f'd^2b}{3l\left(1+\sqrt{\frac{E'}{E}}\right)}$$

the upper or lower expression to be used according as E is less or greater than E′.

The deflection at the centre of a rectangular beam with a distributed load is,

$$\text{Deflection} = \frac{5f\left(1+\sqrt{\frac{E}{E'}}\right)l^2}{48Ed}$$

or,

$$= \frac{5f'\left(1+\sqrt{\frac{E}{E'}}\right)l^2}{48E'd}.$$

The deflection produced by a central load is to that by a distributed one of equal amount in the proportion of 8 to 5.

In the case of flanged girders, let D be the distance between the centres of gravity of the top and bottom flanges, A and A′ their sectional areas; then we have the relation between the forces determined by the equations,

$$W + \frac{l\,w}{2} = 4f\text{A}.\text{D}$$

or,

$$= 4f'\text{A}'.\text{D}$$

If the areas of the flanges are proportioned so that

$$\frac{f}{f'} = \frac{E}{E'}$$

then the central deflection, with a central load, when f is constant, is,

$$\text{Deflection} = \frac{fl^2}{4Ed}$$

or,

$$= \frac{f'l^2}{4E'd}$$

Mr. Donaldson has also devoted a few pages of his essay to the investigation of the ratio of depth to span in wrought-iron railway girders, for which a table is given with the ratios varying according to the spans.

SANITARY CONDITION OF PARTS OF BIRMINGHAM.

Three or four years ago, on the occasion of the meeting of the Social Science Association in Birmingham, we received some abuse in return for the particulars we gave as to the evil condition of parts of that important town. Notwithstanding the time that has elapsed, similar statements have yet to be made. At the recent meeting of the British Medical Association in Birmingham, the president, Mr. A. Baker, said, in the course of his inaugural address;—the area of the borough, 8,420 acres, when divided between 350,164 inhabitants (the estimate of the last census), gives upwards of 124 superficial square yards to each person,—an allowance that probably accounts for our freedom from typhus, as fully as the absence of marshes and bogs explains our immunity from ague. The distribution of this area, however, is not so equal as might be wished for sanitary purposes; the space per head varies in the different wards from 695 square yards in Edgbaston to 31 yards in St. Martin's Ward. Seven other wards yield a smaller superficial area than 100 square yards for each inhabitant. The density of population in the central and older parts of the town may be comprehended, but that districts which have been built since the importance of sanitary rules has been known, should have been allowed to exceed the limits of health in house accommodation, is only to be attributed to the anomalous position of a corporate body which, whilst endowed with powers to levy rates and govern the town, has no authority to curb the crude and ignorant designs of the building speculator, who, in order to secure a large immediate return for a small outlay, is at liberty to construct a court of scanty surface, approached by a narrow alley, with rows of sheds called houses, built back to back so as to support each other; defying through-ventilation, yielding scanty space for the admission of pure air, and as little for the escape of that which has been exhausted by respiration. From these courts, possessing not a single sanitary attribute, containing open middens of faulty construction, arise fœtid exhalations that pollute such air as enters the still enclosure; the leakage from the ashpits through the soil into the wells from which water is drawn gives rise at times to an excessive mortality from scarlatina, typhoid, diphtheria, diarrhœa, and other preventible diseases of a like type. Let contagion enter a space thus circumscribed, and the result may be safely predicted. For the tenants of these defective courts, the only airing-grounds are the streets, which fortunately present many open spaces in various parts. Well might Dr. Greenhow declare that "more than half our annual mortality results from diseases which prevail, with a very great range of difference, in proportion as the sanitary circumstances are bad or good," and that the mortality from preventible disease in certain districts "raises the death-rate of the whole country 33 per cent. above the death-rate of the healthiest part." The powers wanted to suppress this evil need not be vexatious. They are required only for the protection of the poor, embrace the simple questions of ventilation, space, and sewage, and might be safely dictated by a health-officer, aided by the borough surveyor.

On the subject of the sewage difficulty, Mr. Baker said,—

"Whilst sympathising with the Corporation in their efforts and their defeat on this question, there is one marked and culpable defect in the official appointments of this borough which demands severe animadversion. The imperfections that have been mentioned could not have existed unremedied had there been a well-qualified medical officer of health, possessing technical knowledge of hygienic rules; capable of guiding the deliberations of the Council on this subject, and of framing comprehensive plans for the prevention of disease and the promotion of health. Such an officer, rendered independent by an adequate salary, freed from the cares of medical practice, exclusively devoted to sanitary science, and armed with power to exact information and aid from all the executive officers of the borough, would secure to the inhabitants that skilled care which they have a right to expect, would represent faithfully the views of our profession, and would be competent to contribute to those discussions between the 'associated officers of health' which have materially advanced our knowledge of scientific hygiene. The cost of such a man would be more than compensated by a diminished rate of illness and pauperism, a more steady capacity for labour, and a smaller ratio of crime."

OPENING OF THE PORTLAND BREAKWATER.

On Saturday his Royal Highness the Prince of Wales laid the completion-stone of this great national structure. The Prince received a most enthusiastic reception. During the past two months preparations for the event had been in progress. An appeal made by the Mayor, Mr. James Robertson, had resulted in the townspeople subscribing some 700*l.* towards the fund for the decoration of the town alone. The little town was therefore bedecked in the most profuse manner. The Esplanade was rendered gay with flags, evergreens, and flowers, Venetian masts, with heraldic trophies, being fixed in this as also the other public thoroughfares.

The Portland Breakwater, now that it is finished, offers to the eye little more than a thin reef, stretching away almost till it fades. Its magnitude and strength are buried out of sight, but it is a vast Cyclopean wall, 100 ft. high and 100 yards thick at the base. It is heaped up by nearly 6,000,000 tons of stone, which, if built into a solid column 100 ft. in diameter, would overtop the highest Alp. The scaffolding, of which, of course, there now remains no trace, must be described as a wooden railway viaduct, of the most massive kind, built a mile and a half out from the shore, in from 50 ft. to 60 ft. of rough sea-water. Every timber had to be made waterproof and wormproof by the hydraulic forcing of creosote into the pores of the wood, and when this was done a huge pile was made of nine or ten timbers bolted together in one mighty spar of eight or nine tons, some 2 ft. or 3 ft. square. Tipped with an iron screw, this was lowered into the sea until it rested on the bottom, when it was worked round by a capstan till the screw had bitten 8 ft. into the clay. Three or four of these great piles were set at a time, and at once bolted together by many wrought-iron tie-rods and powerful cross-timbers and under-trusses, till the mass was strong enough to carry the trucks of stone for tipping-in. The top of the scaffolding was 30 ft. above the water, or 90 ft. above the ground.

In the construction of the North Fort, these piles were set in two great circles, of 112 ft. and 224 ft. in diameter, upon which, as on a huge dial, moved an immense wrought-iron radial "traveller," dragging the feeding-trains, each with from 60 tons to 80 tons of stone in tow, stopping them over the exact spot where more tipping was required, when, as by magic, the wagons rose on end, and poured their blocks into the sea. Thus,—and this shows the way in which the whole breakwater was built,—a mighty mound was heaped for the foundations of the North Fort, an island in the sea, of 140,000 tons of solid stone, and, with the fortifications, 100 ft. high, 400 ft. in diameter at the base, and 200 ft. at the summit. At every tide the divers went down to level, as well as they could, the masses tipped in, and to report that a little more stone was needed here or there, as the case might be.

This North Fort is in three stories,—one of magazines, two of casemated batteries; and the

armament will be sixty guns in all. The whole structure appears from above a ring of granite, 100 ft. thick, enclosing a centre courtyard, into which look the officers' quarters and men's barrack-rooms.

Taking three fathoms' depth as the standard at low-water, Plymouth Breakwater encloses 1,741 acres, or 150 more than Portland.

CONCRETE AND THE METROPOLITAN BOARD OF WORKS.

At the last meeting of the Board it was agreed,—

"That the application of Mr. Philip Brannon, on behalf of Mr. J. R. Bell, for approval by the Board of a special mode of constructing monolithic concrete fire-proof buildings proposed to be erected on land near Islington-green, be granted, on condition that the concrete used in the construction be compounded according to the conditions in the form of licence now submitted; and further recommending that the said form of licence which has been prepared by the Superintending Architect, and is a modification of the form approved by the Board on the 19th of June, 1868 (No. 11), be approved by the Board, and issued to the applicant accordingly."

And that,—

"With reference to the two cases now before the committee, of the erection by Messrs. Tall & Co., of buildings in East-street, Bermondsey, and Overhill-road, Dulwich, with walls of Portland cement concrete, without having obtained the licence of the Board for the use of that material, that Messrs. Tall & Co. be not pressed to accept a licence for the buildings erected under their patent; and further recommending that a printed circular be forwarded to the district surveyors, informing them that the Board consider the buildings under this patent to be within the rules of the Building Act, and that they will be expected to take proceedings in the usual way in cases where the provisions of the Act are contravened."

A PAROCHIAL INSTITUTION.

A new parochial institution is being erected in George-street, Oxford-street, for the parish church of St. Mark's, North Audley-street, from designs by Mr. Withers, architect. It will comprise industrial and soup kitchens, workmen's club, mission-room, parish and committee rooms, model lodgings for parish officers, and school, &c. The front next George-street will be of red bricks, and will be six stories high. Messrs. M. Allen & Son have the contract, for 4,483*l*. Mr. Laidler is clerk of works. The Marquis of Westminster gives the site.

RECONSTRUCTION OF THE HÔTEL-DE-VILLE, PARIS.

The *Gazette des Architectes et du Batiment* (No. 14, 1872) contains the conditions of the competition opened for the reconstruction of the Hôtel-de-Ville, Paris, together with a plan of the site and approaches. The jury of selection will consist of ten members, named by the Municipal Council, and taken from their own body: ten named by the Préfet, and taken from the Commission of Fine Arts and Historical Works, and ten named by the competitors. The designs will be publicly exhibited, and then the jury will select twenty, considered the best, which will be again exhibited; and then from these the jury will name six. The author of No. 1 will be charged with the execution of the design; No. 2 will receive a premium of 600*l*.; No. 3, 480*l*.; No. 4, 400*l*.; No. 5, 320*l*.; and No. 6, 200*l*. The authors of the remainder of the twenty designs first selected will each receive 100*l*.

THE BRIGHTON AQUARIUM.

The aquarium constructed at Brighton, and which promises to be a very interesting and instructive institution, was opened on Saturday last by Mr. J. Cordy Burrows, the Mayor of Brighton. Mr. G. Soames, the chairman of the company, discharged the duties of president very efficiently at a *déjeûner* afterwards given under the well-known dragon chandelier in the Pavilion, whereat were present the Lord Mayor of London, Sheriff Sir John Bennett, Sir James Duke, and other distinguished persons, including Mr. E. W. Cooke, R.A., Mr. G. A. Sala, Mr. Walter Thornbury, Mr. Carter, Mr. James Dredge, and others connected with art, literature, and journalism, to the number, in the whole, of 200. Mr. Eugene Birch, the engineer, was complimented on his achievement, and Mr. H. Lee and Mr. Frank Buckland were thanked for good services. We propose presently to give some illustrations of the establishment that may be useful, and reserve particulars, with such praise and blame as may seem due, till these appear. We wish the company the greatest possible success.

TAUNTON DRAINAGE WORKS.

A public meeting was held in Taunton on the 8th inst., convened by the Government Inspector, Mr. Arnold Taylor, to take into consideration the necessity and desirability of borrowing 4,000*l*. to complete the sewerage of the district. The scheme proposed consists of bringing the whole of the sewage to one outfall, in the Target field, about half a mile from the town, so that at some future time the sewage may be deodorised and utilised, a scheme for which is under the consideration of the Board.

The proposed arrangements will necessitate the bringing the sewage of the northern part of the town, under the river Tone, by means of an iron syphon, with a depression of about 3 ft. There will also be another iron syphon, under the mill-stream in Tangier, with a depression of 1½ ft.

Also all the closets and drains that empty their filth into the river are to be destroyed. The plans of the joint schemes were prepared by, and the works are to be carried out under the superintendence of, Mr. James Henry Smith, the board's surveyor.

THE COAL QUESTION A SERIOUS SUBJECT.

Some time ago we said, under the above head, "that there were many reasons to lead us to expect an immediate increase in the price of coal." How far this prediction has been carried out the readers of the *Builder* will be able to judge. It was also stated the quantity of coal on which we can with any prudence depend, must be far less than the 146,480 millions of tons which may be reasonably expected to be available for use. Since that time the demand for all kinds of fuel has greatly increased, and the means of meeting the demand are just now being considerably augmented, so that should the present state of trade exist for any great length of time, it cannot but be expected that the quantity of available coal will be consumed long before the time stated by Professor Jevons. It may, perhaps, not be uninteresting at the present time to notice the increased means which are being taken to keep pace with the request in which coal is held. Throughout the Yorkshire coal-field a large number of extensive collieries are being opened out; and in many cases old pits which have been abandoned for years are being turned to account in order that the neglected, and at that period valueless, fuel may be got. These results cannot be wondered at when it is stated that thousands of tons of pit slack were left in collieries in bygone times because it would not pay for the trouble of removing. A different state of things now exists, as what was worse than worthless then now sells readily at 8s. per ton at the pit mouth. But to return to the subject of the development of new collieries. At and near Pontefract, which a few years ago was only known as an agricultural district, a number of new pits have within the past few years been opened out, which may be said to be getting into fair working order; some of them producing from 500 to 600 tons per day. Last week experienced the winning of coal at one of the largest pits in this part of the district, viz., at the Prince of Wales Colliery, close to the Pontefract race-course. The sinking operations have been going on for over two years, having been commenced on the 21st June, 1870. The coal is known as the Haigh Moor seam, and was reached at a depth of 446 yards. It is the property of the trustees of the park, who leased it to Messrs. Rhodes & Dalby at 130*l*. per acre, for fifty years, at a minimum rent, for the first five years, of 300*l*. per annum from the acceptance of the offer, and 600*l*. per annum afterwards. A large quantity of the coal underlying the parish of Roystone, between Barnsley and Wakefield, has just been secured by Messrs. Davy & Co., at 300*l*. per acre. The field, which is a very valuable one, belongs to a number of small holders, who are to receive 1*l*. per acre per year so long as their coal remains unworked;—this amount to be deducted from the sum stated. Sinking operations are to be commenced as early as possible; and as the royalty exceeds 1,000 acres, the colliery will be one of the largest in the district. Within a comparatively short space of time the old Darley Main Colliery, where seventy-five lives were lost in 1849, has been re-started. In other parts of the district old pits have been, and are being, turned to account. Attention is also being paid to the winning of the thin coal seams which abound in the district, and which can be got at a comparatively trifling depth. Many large collieries which have been recently sunk are now getting into working order, and will shortly add to the output of coal to a considerable extent. Amongst others, the Queen's Colliery at Burton Bridge may be noticed. The pit is just being developed, and is now yielding a good quantity of coal. The same remarks will also apply to the New Oaks and the Manvers Main Collieries, which are doing a large stroke of business during the prosperous trade. The sinking operations at a large colliery at Aldam Junction, as well as those at Smithies, are being pushed forward with all speed. In the Durham Coalfield similar steps are being taken for adding to the output, and keeping pace with the large demand. The Bishop Middleham Colliery, which has been idle for several years, is now being put into working order, prior to being started again. What is known as the Old Cassup Royalty, once holding a conspicuous position in connexion with the Durham coalfield, is about to be turned to account. A new shaft is to be sunk between the villages of Cassop and Haugh Hall, at which point the royalty is still almost in its entirety. The Hutton seam, at the Coxhoe Colliery, is also to be worked, so that a great addition is likely to be made to the produce of that district. In Sutherlandshire, the Duke of Sutherland is said to be devoting his energy to the working of the coal measures, which, since the days of Queen Elizabeth, have been known to exist, and which, up to 1827, were regularly worked. It is reported that recent examinations of the Brora district have led to the discovery of an undeveloped coal basin, commencing at Helmsdale, and running parallel with the coast, in the direction of Inverness. Throughout the Derbyshire district, which now sends fully two-fifths of all the coal carried by railway to London, a number of new collieries are being opened out. In the Unstone district, where Messrs. J. Rhodes & Son have just sunk a large pit, the new shafts belonging to the Blackwell Colliery Company (Limited) have just been sunk down to the blackshale coal, which was met with at a depth of 300 yards. It will thus be seen that a large number of new collieries are being opened out in consequence of the brisk trade in coal; but whether they will all prove remunerative in times of quietness remains to be seen.

THE JOINERS' COMPANY AND TECHNICAL EDUCATION.

The prizes awarded to the candidates in the competitions organised by the Joiners' Company were distributed at a court, held at Guildhall, on Thursday, the 1st inst. The master, Mr. J. Johnston, jun., presided; and the wardens present were Mr. Wynter, jun., and Mr. H. L. Phillips. In presenting the first prize to Mr. W. Hodges, of the Spitalfields School of Art (for original design), the master said he had to express the gratitude of the court that such beautiful specimens had come before them. They had offered these prizes to induce those who were training for skilled trades to do all in their power, not simply to raise themselves to distinction in their own branch of art, but to raise the national character. The other prizes from this school were to Messrs. T. Russ and W. Shuter. The first prize, in building construction, was awarded to Mr. W. G. B. Lewis, student at the Charterhouse School of Art for two years and a half. These designs were sent by ten students. The other prize for this school was gained by Mr. F. Ansell. There were three prize-takers from the Birkbeck School of Art, Messrs. T. V. J. Sennett, W. H. Sweet, and R. C. Miller, the latter being for mouldings applicable to ceilings. The prizes consisted of books on architecture and cases of mathematical instruments.

The master addressed a few words of encouragement to the candidates on their leaving. He said it would be for them to show to all around that they were industrious and persevering, and would make the best of surrounding circumstances. Nothing good and nothing great could be achieved without these qualities. They should show they were determined not to "scamp" their work, but raise each one his branch of industry in the eyes of the world.

ORNAMENTAL TILES IN THE SOUTH OF HAMPSHIRE.

During the Southampton Congress of the Archæological Institute, Mr. Greenfield read a paper on this subject. He said that pavements formed of encaustic tiles did not come into use until the end of the twelfth century, and although there appeared to be no natural or necessary connexion between this kind of pavement and Gothic architecture, yet, as a matter of fact, they came in together and went out together; he added this might be attributed to the reformation of religion, and the suppression of the monasteries. Then, alluding to the process of manufacturing inlaid tiles, he produced one found at Beaulieu which was precisely similar in pattern to a tile found at Winchester Cathedral, St. Cross, Christchurch, Romsey, and St. Deny's, but differed in the number of spots on it and in the borders. Ancient kilns for burning these tiles had been discovered in Worcestershire, Staffordshire, and other places. At present Beaulieu was renowned for the good quality of the brick earth or clay proper for making bricks and tiles, which was found in abundance in its neighbourhood. He was not aware that a monastic kiln for the burning of decorative tiles had been discovered in the southern part of this county. Most probably there were such at Beaulieu, and Quarre, in the Isle of Wight, if not at Netley and Romsey, and the neighbourhood of Winchester. But, in any case, from the similarity of the patterns of the tiles that were to be seen in the pavements of Winchester Cathedral, the Hospital of St. Cross, and the churches of Romsey and Christchurch, and of the tiles that had been discovered in the ruins of St. Deny's Priory, and Netley and Beaulieu Abbeys, more especially at the two latter, there was sufficient evidence to show that many of the tiles used at all these six places were made either from the same or precisely similar moulds. To illustrate his meaning he directed attention to specimens of tiles on the table before him, and drawing in fac-simile which his daughters had made from tracings they had taken of patterns still remaining at Netley, Beaulieu, Christchurch, Romsey, and Winchester, and likewise the set of fac-similes of patterns from Beaulieu, kindly lent him for the occasion by Lord Henry Scott, M.P., and the Rev. W. H. Lucas, vicar of Sopley. Of his own tracings of patterns from monasteries and churches in the south of this county, and from the Nunnery of Tarrant, in Dorsetshire, there were 105 fac-simile illustrations. Of these examples 43 were from Netley, 34 from Beaulieu, 39 from the Church of the Hospital of St. Cross, 57 from Winchester Cathedral, 33 from Romsey Abbey Church, 8 from the Priory Church of Christchurch, and 5 from Tarrant Nunnery. Besides these there were two examples from Netley in the plate which accompanied the Rev. E. Kell's excellent and exhaustive article on Netley Abbey, which formed part of the "Colledania Archæolgica," and four examples from Romsey and Winchester in Mr. Nicholl's series, which he had not taken. Mr. Greenfield then pointed out several examples and described their peculiarities at some length, including unique specimens from Netley, Beaulieu, Winchester, St. Deny's, St. Cross, Romsey, Sopley, and Tarrant (Dorset), pointing out their relationship, and, in many instances, great beauty. He spoke highly of the rare and excellent work of the Messrs. Skelton, of Southampton, of which only four copies were purchased, entitled "Patterns of Encaustic Tiles found at the Ruins of Priory to St. Dionisius, near Southampton," containing twenty different examples, admirably printed from blocks in the proper colours by the double process, one of which copies he was enabled to lay before them through the kindness of the Rev. E. Kell, and proceeded to say that he had made out that of the thirty-four different examples noted at Beaulieu twenty of the same identical patterns were found at Netley, and that out of the forty-three different examples noted at Netley only five were solitary, or without example elsewhere, while of the thirty-four at Beaulieu only four were solitary. There was enough to show that these two abbeys, as well as other monasteries in the neighbourhood, possessed decorated tiles of precisely the same pattern, if not made in the same moulds. It was not improbable that a closer connexion, and the interchange of kindly offices between the monks of Beaulieu and Netley, might have arisen from their being members of the same order, and governed by the same rules, and from the fact that on completion of the foundation of Netley its first abbot and monks were chosen from Beaulieu. Both establishments were of the Cistercian order, which took its rise in about the year 1075, and was introduced into England in 1158, by William Giffard, bishop of Winchester, on his founding the Abbey of Waverley, in Surrey. Before the dissolution it had eighty-five houses in this country. Beaulieu Abbey was founded by King John in 1204, while Netley Abbey was said to have been founded by Henry III. in 1239, in fulfilment of the wishes of his former tutor, Peter de Rupibus, bishop of Winchester, who founded the Augustinian Priory of Selborne, in this county, in 1233, and who died in 1238, leaving a sufficiently large sum of money to found this abbey and another, and furnish them with whatever things were requisite. The Benedictine Nunnery and Monastery of Romsey were founded by King Edgar, A.D. 967; the Augustine Priory of St. Deny's, near Southampton, by Henry I., in 1124; and the Benedictine Monastery of Wherwell by Elfrida, queen of King Edgar, in 986. Attention was drawn to the heraldic insignia on a fragment of an encaustic tile found at Netley, now in the possession of the Rev. E. Kell, which there were grounds for believing was of Beaulieu design, and was made at that place. There was a remarkable similarity of design in the geometrical tracery and foliage to that on a tile in Warblington Church, at the south-east end of this county. But it was not from the same mould, and it differed essentially in the heraldic charges and emblems. Yet in both the armorial insignia related to the same family, though most probably not the same person.

THE TRADES MOVEMENT.

The last monthly report of the Operative Carpenters' and Joiners' General Union of Great Britain and Ireland sums up its review of the position of affairs thus:—

"The Amalgamated Building Trades Committee are at a dead lock: but the deputations of the Central Council of the Carpenters and Joiners are systematically organising the whole kingdom, and funds are flowing in to such an extent that victory may safely be predicted. A general lock-out on the part of the masters is not feared, but rather courted, as it will test the earnestness of the men, who appear now to be united to a man."

On Saturday, the finance committee at the Brown Bear, presided over by Mr. Thomas Hall, the treasurer (Amalgamated Union of Carpenters and Joiners), and Mr. C. Matkin, the secretary (General Union of Carpenters and Joiners), stated that the dividend this week would certainly not be less, but most likely more than last week. According to the same report, there are sixty-six towns, including Liverpool, Manchester, Leeds, Sheffield, and Birmingham, where the employers and the men have agreed upon a code of working rules, one of the points for which the London men are now contending. It was also stated that last month, at Chorley, an agreement was come to with the masters to fix the week's working time at 49 hours, at 7d. per hour, with a code of working rules, while at Keighley the working time was reduced from 54 hours to 50½ hours, at the same rate of pay, with a code of rules, and that on and after the 1st of October next a similar regulation is to come into operation at Blackburn. Strikes are now on at Sheffield and Leicester, towards which the General Union has contributed, in the shape of strike-pay, 308*l*. The General Union has seven branches in London. It was stated in the Central Committee of the Carpenters and Joiners, a few days since, that one of the interdicted employers was willing to set the example of conceding the nine hours pure and simple, at 8½d. the hour, with the understanding that should a code of working rules be ultimately agreed to in any general settlement of the dispute it should be adopted in his shop. It was remarked, however, that the other masters might one by one follow suit, and in the end the code would come to be shelved. To keep up the dividend will require a good deal of pushing in the provinces, as the London levies are not all that could be wished. The distribution was made in round numbers to about 1,550 men, at the rate of 14s. 6d. per week to the men on strike from Jackson & Shaw's and Brass's, and 11s. 6d. to the rest, who, of course, constitute the vast majority of the whole. According to the latest inquiries, the masters, for the most part, have obtained sufficient hands to carry out all pressing contracts or orders. Neither the general committee nor the sub-committee of their Central Association have any idea of holding a meeting until September, unless, in the meantime, the men express a desire to make terms. We do sincerely hope that this will be the case.

Newcastle and Gateshead.—The house carpenters and joiners have struck work for an advance of wages from 28s. to 30s. a week. A deputation from the Masters' Association and a deputation from the Workmen's Union have met, in order to try and bring about a settlement of the dispute. No definite result, however, was arrived at. The operative joiners have since accepted the terms of the masters, 7d. per hour, and have returned to work.

Halifax.—A meeting of the carpenters and joiners has been held on behalf of the London joiners now on strike. A deputation, consisting of Messrs. Sadler (chairman of the London delegates) and Wright, gave a full statement of the present position of the London men, and the history of the movement up to the present time, the determination to remain on strike being unanimous. A resolution was passed to "levy" the Halifax men at 6d. per week, in support of their London brethren.

Agitation in the Brick Trade.—At a well-attended meeting of the operative brick-makers of the Rowley, Old Hill, and Hales Owen Union, it was unanimously resolved that those men who had not obtained the reduction of hours should request their employers to reduce their working hours to fifty-four per week, and if not conceded it was resolved to give fourteen days' notice.

Expected Lock-out of Engineers at Birkenhead. An offer by the Liverpool and Birkenhead master engineers to their men having been declined, notice has been issued by the master engineers of a lock-out, to commence on the 22nd. Two crowded meetings of workmen have been held in Birkenhead, at which the masters' terms were unanimously rejected.

A Strike and its Consequences.—The strike of the goods porters on the London and North-Western Railway has come to an end. The company having received a sufficient number of men from Scotland and the provinces, to take the places of those who had turned out, posted placards, "No more men wanted." Upon this many turnouts offered to go in unconditionally, and a few of the most able were selected. The larger number, finding that all chance of regaining their employment was gone, tore the strike colours from their button-holes, and dispersed. At a meeting of the directors thanks were voted to the clerks and men who had remained at their work, and double pay was ordered to be given them until the reorganisation of the stations was completed. It was also determined, that in filling vacancies in the higher classes, preference be given to the men who had remained faithful.

SMOKE PREVENTION.

Vicars's self-stoking apparatus has been fitted up to boilers employed in driving the machinery that prints the *North British Daily Mail*, in Glasgow. The most prominent external feature of the apparatus is a hopper for holding the fuel, and which may be of any size. At the bottom of this are two small receptacles, one at each side, which are made to contain a given charge of coal. These charges are forced into the furnace, one at a time, by two plungers or pushers, one of which is moved forward while the other is coming back. These plungers are worked by a shaft moved by a ratchet, so arranged that the rate of feed can be varied at pleasure, by causing the driving eccentric at each stroke to take a greater or lesser number of teeth. Once in the furnace, the fuel is carried onward by movable bars, which all move forward together about 3 in., and are brought back one by one. Movable furnace bars are not a novelty, but the mode of their application in Vicars's furnace is an important and original feature. Each bar is provided with a trough containing water, in which a centre rib cast on the bar is immersed, while the upper part of the bar forms a perfect cover to exclude cinders or ashes from the trough. By this device the burning out of the bars, or their getting blocked up with clinker, which, before it was had recourse to, were constant causes of trouble, are said to be effectually avoided.

In Vicars's furnace a small and uniform amount of fuel, just what suffices to replace that consumed, is being constantly added to the fire, which is supplied with exactly as much air as is calculated to enable combustion to be carried on

in the most economical and effective manner. The result of this is, that not only is smoke prevented, but all waste of fuel is avoided, and an important saving in the quantity consumed is effected, in addition to which the finest dross can be burned with as much advantage as the coal of which it is the refuse. The apparatus can be applied to any kind of boiler, and to reverberatory furnaces of all descriptions. There are hundreds of these self-stokers at work throughout the midland and northern counties of England.

ST. CHAD'S COLLEGE, DENSTONE.

A MEETING has been held in the hall of St. Chad's College, or School, Denstone, of the friends of middle-class education. The gathering was summoned by the Rev. Canon Woodard, Provost of St. Nicholas's College, Lancing, in order that all interested in the education of the middle class should have an opportunity of seeing what has already been done in St. Chad's College, and what yet remains to be done, before the college can be opened. The company lunched together at one o'clock in the great hall of the college, and afterwards, by the invitation of the Earl of Shrewsbury and Lady Shrewsbury, attended a garden party at Alton Towers. A view and plan of the school were given in the *Builder* of 29th June, and to the particulars then given we may here refer. Denstone is in the very centre of the Midland districts of England. It is anticipated that this school at Denstone will before long be subordinate to some greater establishment like Lancing, which will form a centre for the supply of the educational wants of the Midland counties. To this will be added a lower middle school, where boys will be boarded and educated for fourteen guineas a year. A middle school for girls must also be founded, similar to that at Bognor; and a large donation has already been offered for each of those schools. These extended operations will entail colleges for the Midland counties in federal relation with St. Nicholas's College, but otherwise independent of the Sussex schools. The works have been pushed on: the centre and one wing of the great quadrangle will soon be roofed in, and the head-master's house is in a forward state. It is hoped that in the course of another year such portions of the building will be complete as will enable the college to open with at least 200 boys.

The Bishop of Lincoln, in the course of a speech, announced that Sir T. Percival Heywood had subscribed 30,000*l.*, to found a chapel in Keble College, Oxford, and commended his example to other merchant princes in the district.

THE FATAL ACCIDENT AT HALIFAX.

THE inquest as to the cause of death in the accident, reported in our last, which occurred by the falling in of a portion of the flooring of the new part of the Bonding Warehouse in Gibbet-street, whereby two men were killed, and another severely injured, has been held.

After some evidence was heard, the jury retired to deliberate as to whether it was necessary to call further evidence, and after being in consultation for some time, the public were again admitted, when the foreman said the jury had decided not to call any scientific evidence as to the construction of the building; but there were one or two links in evidence that required clearing up. The first of these was when the deflection in the floor was first discovered; what means were taken to remedy it; and what precautions had been taken to protect those engaged in this remedy.

George Lister, employed at the bonding warehouse, said that when he was in the cellar with the workmen there was no talk of there being any danger. Halliday knew the foundation-stone was broken. The floor had been tested by the borough engineer, by placing heavy fine sets on it; and at that time the arch gave way. After that Mr. Henry and Mr. Thwaite ordered them not to place any goods upon that portion of the floor.

Mr. Peter Borrie, borough engineer, said that the testing by granite sets took place on the 11th of July. The weight of the test was about 28 tons, which was placed on the centre of one bay, between four columns, and over an area of 15 ft. by 9 ft. On the following morning one of the columns had sunk, and the floor had gone down in the centre. He saw no signs of any immediate further deflection. In the afternoon he saw one of the contractors, Mr. Denton (of the firm of Quarmby & Denton), in whose hands the buildiug was at that time. He pointed out to Mr. Denton the defective work found out by the testing, and told them it arose from their defective workmanship. Denton replied that it was not the fault of the contractors at all, but that the stone at the foundation of the column was not big enough. Witness told Denton that the contractors were responsible for the damage that had arisen. Witness then waited a few days to see if the contractors intended to do anything. They did nothing, however, and on the 19th witness sent a man in with instructions to bare the top or the base of the column. This was done, and he found that the flange of the column was broken. He then gave instructions that the man should go carefully down on each side of the stone, to see what was the matter with it. When this was done he found that the stone had split in two. Underneath the stone he found there was a space of 14 in. between the footings. That portion of the stone bearing the column was 2 in. lower than the other portion. He then wrote to Quarmby & Denton, telling them of the state of matters, and requiring them as early as possible to remedy the defect of the foundation-stone, to build two brick pillars under the beam, and to relay the flagging over the arch. That letter was dated 30th of July, and to it he received a reply next day, in which they declined to do the work, as they considered the test excessive. On the 3rd of August, witness wrote again to Messrs. Denton & Quarmby, informing them that, in accordance with their contract, he should employ other men to do the work, and deduct the amount from their account. Accordingly, he instructed his assistant, Mr. Richardson, to see Bancrofts about doing the work. Afterwards, in describing how the work was to be done, witness had ordered that the pillars should be erected before the foundation-stone was touched in any shape. In the way the work had been done it was absolutely necessary that the beam should be propped. He expected that those who undertook the work would have gone about it in a sensible and workmanlike manner. By the Jury: The reason why he tested the floors was, because they were not done according to drawing or specifications. On the 16th of May, an interview took place between witness and the contractors, in consequence of the arches being built lower than the specification. The contractors said that arose from their joiner having made a mistake in constructing the centres; and they agreed that the arches should stand a week, and then be tested; and that if they stood the test, the engineer should waive his right to have them rebuilt. Hence it was that the tests were applied.

Mr. Richardson, assistant borough engineer, corroborated this evidence.

The jury then retired, and after a deliberation of a little over half an hour they found as follows:—"We, the jurors, unanimously find that Samuel Thwaite and W. H. Halliday came to their deaths on the 6th day of August, by reason and in consequence of the fall, on the same day, of a portion of the floor of the Inland Bonding Warehouse, in Gibbet-street, in the township and borough of Halifax, which floor also formed underneath the arched roof cellar in the basement thereof; which floor and roof were supported by iron columns and girders; and we also unanimously find that the said floor and roof fell in consequence of the giving way of the foundation stone of one of the iron columns, and the fall of the same, and the iron girders resting thereon. That the immediate further subsidence of the foundation stone was caused by the incautious digging on the westerly side of, and removing the flags and soil close to the said foundation, thereby giving it room to force itself and the column from their proper and erect position; and the jury is further unanimously of opinion that due precautions were not taken previously to the commencement of so important and dangerous an operation, by the proper supporting of the said roof and floor by means of props and timber, or otherwise."

The inquest, which commenced at ten in the morning, did not conclude until half-past nine at night.

SLAUGHTER-HOUSES IN THE METROPOLIS.

THE medical officer of health for Whitechapel, Mr. John Liddle, draws attention in his last report, just now issued, to the provisions of the Building Act of 1844, which makes it unlawful, after the lapse of thirty years from that date, to slaughter cattle in any building or vault, or in the open air, at a less distance than 40 ft. from a public way, or than 50 ft. from a domestic dwelling, and to the endeavour that was made to repeal this by the introduction of a Bill to amend that Act, so far as it relates to the slaughtering of cattle and sheep, and to render permissible the slaughtering of cattle in butchers' private slaughter-houses. The following reasons Mr. Liddle gives, why the provisions of the Act of 1844, relating to slaughter-houses, should be continued:—

"1. Because slaughter-houses as now conducted are nuisances, and injurious to health, and although, theoretically, they may be kept 'as clean as any paved wash-house,' it would be found impracticable to do so; and it would be impossible to enact a law which should compel the owner of a slaughter-house to prevent offensive smells from issuing from his premises.

2. Because private slaughter-houses afford facilities for the slaughtering of diseased animals, and enable the owners of such diseased animals readily to dispose of the unwholesome meat. The improper use which is made of private slaughter-houses was pointed out in my quarterly report for December, 1869.

3. Because the driving of cattle through the crowded streets of London is not only a great annoyance to the inhabitants, but is a source of danger to life and limb.

4. Because the erection of a sufficient number of well-ventilated public slaughter-houses in suitable places, within reasonable distances from the centre of the metropolis, would be highly advantageous to the whole population, inasmuch as the animals intended for slaughter would be inspected by qualified officers; and if found to be diseased, proper steps would be promptly taken to prevent the use of such meat for human food.

5. Because the flesh of the animals slaughtered in airy and well-ventilated public slaughter-houses, and under proper inspection, will keep longer in a fresh state than when animals are slaughtered in some of the ill-ventilated slaughter-houses in London.

If the City of Glasgow, with a population of 500,000, has thought it expedient, as a means of improving the public health, to prohibit the use of private slaughter-houses, and has erected three public slaughter-houses for the use of the butchers, it is surely quite possible, with the same object in view, for the local authorities in London to erect a sufficient number of public slaughter-houses for the slaughtering of all the cattle which are required for the use of the inhabitants of this vast city.

In the reign of Henry VII. a petition was presented to Parliament by the parishioners of the parish of St. Faith and St. Gregory, in London, setting forth that they had been greatly annoyed and distempered by the corrupt airs engendered in the said parishes by occasion of blood and other foul things by reason of the slaughter of beasts.

In consequence of this petition it was enacted, Anno Quarto Henrici VII., cap. iii., that no butcher or his servant should slay any beast within the walls of London. It was also enacted that half the penalty for committing the offence should go to the king, and the other half to every one of the king's lieges that would sue for the same by action of debt."

SOFT FELTED FABRICS OF PAPER.

AMONGST the novelties of the International Exhibition at South Kensington, not the least remarkable are the new patent felted papers of Messrs. Pavy, Pretto, & Co. All the windows and doors of the Exhibition are fitted up with curtains of this new material, into which a certain quantity of animal fibre has been felted, and which is said to give a remarkable toughness to the fabric, without any very great addition to the cost. Curtains, blinds, and bed-furniture, of various patterns, are produced at very low prices; and it is fully expected that the new material will replace leather in the covering of chairs, binding of books, &c. The feature to which special attention is drawn is its superiority over cotton and woollen materials for the curtains of sick-rooms. It is non-absorbent, easily brushed, and not likely to retain contagion.

Paper seems destined to vex the tailors and linendrapers, unless they take to it kindly themselves, and share the profits with the stationers. A paper suit of clothes for 2s. is the latest novelty, and it hails from New York. The tailors have not introduced it; but the drapers are selling the articles, which are of Japanese make. These paper dresses are said to be as tough as leather, and as pliant as linen. Rain will not reduce them to a pulp. Perhaps they will even wash.

SCHOOL BOARDS.

London.—It has finally been resolved by the Metropolitan Board of Works to lend the London School Board, 40,000*l.*, to be expended in the erection of permanent offices. In reference to the competition for the Board offices, the committee selected four architects to compete, and it was thought only fair that the unsuccessful competitors should be paid for preparing the plans to the extent of twenty-five guineas each, whilst the successful one would have charge of the building. As to the arrangement of the building the committee stated they would be glad of any suggestions by members before the specifications were sent out.

Ross. — The Educational Department will be ready to sanction schools for 120 boys, 120 girls, and 180 infants, arranged in accordance with instructions referred to. Mr. Pearson has been instructed to prepare plans and specifications for the erection of new schools; also of boundary walls, and the levelling of the Henry-street site. The building to be of native stone, and the proportions according to the letter received from the Education Department, and the resolution passed by the Board.

Batley.—The designs committee have drawn up a series of instructions to architects competing for the premiums offered for the best

designs for a school to be erected at Purlwell, to accommodate 700 children—300 boys, 250 girls, and 150 infants. One of the conditions is that the total cost, exclusive of boundary walls and internal fittings, is not to exceed 5,000*l.*

THE THUNDERSTORMS.

These storms have not yet ceased, but they seem to be on the wane. Their history during the last eight days resembles that of the week previous, but not quite to the same extent, although houses and persons, cattle, and so on, have been struck on many occasions. A curious mischance occurred at Forres, in the north of Scotland. One of the chambers of the North of Scotland Chemical Works was struck by lightning, and destroyed. It was 8 ft. 6 in. in length, 16 ft. in width, and 16 ft. in height, and was built of thick sheet lead. It contained 70 tons of sulphuric acid, which, when the collapse took place, flooded the works and escaped. The loss is estimated at 1,000*l.*

In our last, we spoke of the storms of 1868 which preceded the great earthquake. It so happens that since our last a small earthquake has occurred in Scotland. The locality (Bridge of Allan) is one where a similar shock occurred in 1839, when the shock passed from Lisbon, through France and Great Britain, to the north-west of Scotland.

Now Lisbon, on the west coast of Europe, is where a great earthquake once occurred, and we know that in the case of the American coasts it is where great earthquakes have heretofore occurred that earthquakes seem to be liable to occur again, and that the great earthquake of 1868 happened. There has also been a recent earthquake in Algeria, near the Portuguese and Spanish peninsula; Antioch, not far off, has been half destroyed by earthquakes; and although there may be no greater earthquake anywhere this year than has already happened, the coincidence is curious; and, at all events, these physical and electrical commotions appear to be all connected in one way or another.

THE WORCESTER GUILDHALL QUESTION.

At a recent meeting of the Worcester Town Council, the report of the Survey, Building, and Property Committee, as to the Guildhall plans, was formally received.

Mr. Grainger said the question now occupying the attention of the council was one of the most important they had had to deal with for a long time. The plans signed *Fiat Justitia* and *Bakalum* appeared to be the best; but the council were left in the dark as to the cost of carrying out the buildings according to these plans. It might cost from 40,000*l.* to 50,000*l.* He thought the wisest course the council could take would be to defer the discussion of the subject for three months, and to instruct the committee either to advertise for further plans (no, no) or seek further information from those who had not afforded sufficient particulars respecting the plans sent in.

Mr. Smith said the estimate of cost of the building to which *Bakalum's* plans referred was 18,000*l.*; that of *Fiat Justitia*, 17,550*l.*

Mr. Lovesey suggested that the question should be referred back to the committee for final settlement, and that they should have power to call in professional assistance if necessary. Supposing they took this course, and the committee found, when they had investigated the plans, that the expense of carrying them out would exceed the estimate of 18,000*l.*, it would become a question whether the person sending in such a plan should receive the premium.

After some further discussion,

Mr. F. Woodward submitted a proposition to the effect that the Survey Committee be instructed to employ a competent surveyor to assist them in their decision as to the best plan, and report thereon to the council.

It was, however, ultimately moved by Mr. Lovesey, seconded by Mr. Bozward, and carried, Mr. Woodward only dissenting, "that the plans be referred to the Survey, Buildings, and Property Committee, with instructions to select those they recommend to the council as entitled to the premiums offered by the instructions to architects."

At a subsequent period of the meeting,

Mr. Airey presented a memorial from a public meeting held recently against the proposed rebuilding or reconstruction of the guildhall, and recommending the necessary repairs to be effected. This memorial was received, and pursuant to notice, Mr. Airey then moved—

"That the memorial now read be received, and in complying with the prayer thereof, the Council instruct the Survey, Buildings, and Property Committee not to take any further steps at present for the re-building or reconstruction of the guildhall, but that they proceed to ascertain what repairs are necessary with a view to the same being executed with all convenient despatch, and report the result of such investigation to the next meeting of the Council."

At the close of another discussion,

Mr. Airey replied on the whole question, and the vote was then taken, the names being recorded. There were against the amendment, 24; for, 5. The motion was therefore declared lost.

ARCHITECTURAL ASSOCIATION EXCURSIONS.

The Northamptonshire excursion, under the guidance of Mr. Edmund Sharpe, will last from the 19th inst. to the 24th, on the former of which dates the party will leave the King's-cross Station, London, by the 7·50 train, and will arrive at Peterborough at 10.16; thence they will proceed by the Midland Railway, leaving Peterborough at 10·32, and arriving at Stamford at 10·52 a.m. The dinner will take place at the George Hotel, Stamford, where Mr. Sharpe will deliver an address. From eight to eleven buildings will be visited each day. The final dinner will take place at Northampton.

THE PRE-HISTORIC REMAINS ON ROMBALD'S MOOR.

The members of the Leeds Naturalists' Field Club and Scientific Association have walked over Rombald's Moor* from Saltaire to Ilkley, under the guidance of Mr. John Holmes, of Methley, for the purpose of examining the rock markings and primitive structures discovered there.

On the top of the hill over Shipley Glen they found the first specimen, consisting of a circular elevation, along the inner and outer edge of which were placed, at intervals, slabs of grit-stone, set on edge. Between these two circles there was a sort of irregular pavement, made up of small fragments of the same kind of stone. Mr. Holmes pointed out the chief features of this circle, and called attention to many pieces of rock whose smoothly-planed surfaces indicated unmistakably the former presence of glaciers. The party passed through the village of Eldwick; and near the "Shooting-Box" a well-defined circular elevation, eleven or twelve yards in diameter, with a single row of stones, was come upon. Mr. Holmes explained that structures of the same kind had been found in Algeria, in Denmark, Sweden, and even in India; and Mr. Teesdale stated that he had often seen such circles in India, as well as in Palestine; but that there they were in a more perfect condition. Mr. Holmes further stated that they were supposed to have been erected by the Turanians, and exhibited a "flint flake," found in the circle under inspection, as confirmatory of such a supposition.

At that part of the moor which is immediately above Ilkley, circles of stones, more or less complete, were seen in abundance, many of them being of very large dimensions, and in some cases enclosing smaller ones. Other lines of stones there were in which curvature was scarcely, if at all, evident. Many of the circles contained a large boulder in the centre, and on the upper surface of this were ring and cup marks. In two or three instances some of the party cleared away the soil from the top of large boulders, and unearthed fine specimens. In some cases, as elsewhere, there was only a cup visible; in others, the cups were surrounded by one, two, or three rings. The abundance of these cup and ring marks was astonishing.

IRON AND THE IRONWORKS OF ROMAN BRITAIN.†

For countless ages before iron came into the humblest use, mankind had passed through the toilsome periods of stone or flint cutlery; then of copper, pure, soft, and well-nigh useless, till, at a later time, hardened by tin, which the commercial enterprise of the Phœnicians transferred from Cornwall to Sinai.

In the comparatively civilised days when the Grecian chiefs wasted ten years in wrangling round the walls of Troy, bronze was the metal used for their offensive and defensive armour; and Pliny, in his Natural History, tells us that, by an express stipulation, the Roman people agreed with Porsena that they should only use iron for implements of agriculture. This was about 400 years before the Christian era, and for nearly 300 years more they continued to use bronze weapons, with which they encountered Hannibal, in the second Punic war.

Yet we have allusion in the Scriptures to the somewhat extensive use of iron in the times of Moses; and we all remember that the great king of Basan, Og, boasted an iron bedstead, although we do not know what resemblance that article of furniture would have to the present Birmingham make.

Sisera, too, had 900 chariots of iron, which indicates an extensive iron rolling stock in his time, which was 1,300 years before the Christian era.

But as we pass further west, into the land of the Gauls and Britons, we find bronze weapons in almost universal use at the period of the Christian era.

From these dates we are enabled, in some measure, to note the high progress of civilisation which the nations of ancient Syria had attained at a very early period, as compared with that of the West of Europe. When Cæsar landed here, he found a limited use of native iron amongst the natives, as he states, in rings for money; but he must have been in some error here, for gold and silver coinage existed to a large extent in Britain before his arrival.

The tardy introduction of iron into the West can only be ascribed to the difficulties involved in generating the high heat required to smelt it.

The most productive method which appears to have been employed was to construct a small air "bloomery," or blast furnace, or chimney, of clay, in which alternate layers of ironstone and charcoal were placed, and through the bottom of which funnel-shaped holes entered from the side. This primeval structure stood on the top of high ground, and when the wind blew, a species of feeble blast was obtained, and the ore was sufficiently reduced to be capable of manipulation between heavy stones.

I need not state that this was a "cold blast" process, and I cannot find that the idea of "hot blast" seems ever to have entered into the head of the primitive ironmaster. Yet we do find a rough conception of it in the furnaces of the ancient Peruvians for smelting silver, who employed furnaces such as those described, but with the addition of stone hearths outside the air-hole, on which burning charcoal was laid to heat the air before it entered the furnace: this is "hot blast."

The next improvement in the iron make, appears to have been the employment of bellows for creating an artificial blast: these seem to have originated in Central Asia, and consisted of goat-skins, worked by a woman or a boy, probably by the feet. This was a great step in the right direction. Those amongst us who take an interest in the iron trade, no doubt have read of a number of experiments conducted by Mr. Crampton, of Woolwich Arsenal, on the proposed employment of coal-dust in reverberatory furnaces, yet we find that in India the charcoal used was frequently ground into dust, also the furnaces were charged from the top as the Staffordshire blast furnaces are now-a-days.

The iron masters of Roman Britain, appear to have worked on a very extensive scale, and seem to have made use of water-power for driving their blast or bellows; for the most extensive remains of cinder-heaps are generally found by the side of streams in Britain, and both in Sussex and in the Forest of Dean remains are found of ancient tanks in such situations as to point directly to their use as reservoirs of motive power. But the most remarkable invention for producing "blast" discovered in Roman Britain was found at Lanchester, the Ancient Epiacum, in Durham, where extensive ironworks existed, and where, no doubt, the arms of the two legions on the wall were fabricated and repaired.

Dr. Bruce, describing the spot, says:—"The method of producing the blast necessary to swell the metal was made apparent. Two tunnels had been formed in the side of a hill, they were wide at one extremity, but tapered off to a narrow bore at the other where they met in a point. The mouths of the channels opened towards the west, from which quarter

* The western moorlands of Yorkshire are a part of that long range of mountains,—the Pennine chain,—which stretch north from Stafford into Scotland.

† From a paper by Mr. Grover. Read at meeting of British Archæological Association, at Wolverhampton.

a prevalent wind blows in this valley, and sometimes with great violence, — the blast received by them would, when the wind was high, be poured with considerable force and effect upon smelting furnaces at the extremity of the tunnels."

Now without venturing to approach technical ground too closely, I must ask you to follow me to its confines a little, while I endeavour to explain the leading changes which occurred in the iron make in consequence of the forms of the furnaces.

First, we have the "air bloomery," or air furnace of the high hill, driven by the wind, as it passed through little conical holes in the sides. This must have been a painfully slow and fickle process, and the ore would become de-oxidised, and by long-continued low heat a "cementation" of the metal would take place. There would be no fusing, no melting of the ore, no oozing metal or liquidification as we get from our blast-furnaces, but the product would be a glowing mass of imperfectly malleable or wrought iron, mixed with cinders, dirt, and unreduced oxide. This lump would be drawn out of the top of the furnace, and put under heavy tilt-hammers, driven by water or animal power. At each successive blow the glowing mass would acquire purity as the sparks flew from it. The Roman forgeman would keep on turning it round, and over and over, till at last a "bloom," or block of wrought iron would result.

The first great improvement in this process would be the addition of artificial blast in bellows. This was the furnace of Roman Britain, and would be called a "blast bloomery," in contradistinction to the air bloomery, which probably preceded Roman times here.

The application of blast would offer great advantages,—it would obviate the necessity of an elevated site, and render the whole process more equable and certain. Yet, although the method of reduction would remain the same, the result would be very different; for if the blast was strong enough the iron would be melted, and a partial carbonisation taking place, a sort of Bessemer steel would result, totally useless to the Roman smith, as he could not forge it.

So it became necessary to invent another process,—a primitive refining. The metal was reheated with plenty of charcoal, and the bellows-pipe, being removed from the bottom of the furnace, would be put on the top, and direct the blast over the surface, charcoal being also put on from time to time till it was all burnt out, and the iron became tough and malleable. It is possible that the entire operation was conducted as in the Catalan forge, in one heat or at one operation, and all conducted in one little furnace, viz., the "blast bloomery."

I shall perhaps be travelling out of the subject if I give any more processes, for to this stage only had the iron manufacture reached amongst the ironmasters of Roman Britain; yet a word on the subsequent great invention of cast-iron, which forms the staple of our modern industry, and which the Romans had not reached except perhaps incidentally.

The modern "blast furnace," such as we see in this Black Country, which turns out its many hundred tons of "cast-iron" or "pigs" a week, and sends flames and smoke to heaven, like some angry volcano in its wrath, is but the man full-grown from the child, the "blast bloomery."

As demand increased, the little bloomery waxed higher and higher, from the infantine 3 ft. or 4 ft. of the third and fourth century of Roman days, to (curious coincidence) 15 ft. or 16 ft. high in the sixteenth century. This is the boyhood of the blast-furnace; but now we see him 40 ft. high, and even more, in his swarthy pride of giant manhood.

His increased height, however, had caused a great change in his capabilities, and the result is most surprising. As the ore descended from the top through a longer length, its contact with the charcoal would be prolonged, and a higher state of carburation ensuing, the product would be "cast iron."

This new era in Iron's story is supposed to date from the latter half of the sixteenth century. Mr. Mushet endeavours to fix the date of the first blast-furnace in the Forest of Dean at A.D. 1550, but he never saw a casting older than 1620. The progress then became rapid; for in the seventeenth century iron was exported from England.

Mr. Grover next showed that, although the Romans had mineral coal at nearly all their stations, and it was not unfrequently met with in their villas in Britain, yet only charcoal was used in smelting. In the Roman villas in Britain vast quantities of iron were used, much more than in an English modern house of similar dimensions. The number and variety of iron keys were truly surprising, and gave one an astonishing insight into the elaborate domestic economy and housekeeping arts of our early conquerors here. Chests, caskets, cupboards, pantries, sideboards, and dressers, though long perished, were indicated by their locks and keys, and must have been a goodly array. Besides, they found door-keys and locks, and bolts and hinges, and what was more curious, lifting-latch keys, such as were now used by late bachelors in London houses. Then there were padlocks and cylindrical locks, and keys attached to rings to wear on the finger, though these were generally of bronze. Fire-dogs, of handsome make, in iron had been found, showing that fire-places had been partially in use in some of the apartments. In addition to the articles already named they found numerous hunting weapons, knives, scissors, and nails of all variety of sizes, not only for building purposes, but for the soles of the sandals of Roman farmers. At Chedworth Villa, two large masses or blooms of iron were found, evidently brought to the villa to be worked up, and this was, perhaps, the explanation of the quantity of iron generally found. A resident smith was employed in the villa. He was always at it, and when the repairs of locks, keys, and farming implements did not keep him going, he no doubt employed his time in working out some of the little ingenious iron devices in rings and keys. The chief locations of the iron industry in Roman Britain were in Sussex, in the vast forests of Anderida, as the locality was then called, and the Forest of Dean. Pits from which the ore had been extracted were found in Sussex, together with great heaps of cinders, accompanied with Roman pottery and coins; but it was on the banks of the Wye that the most workings existed. Indeed, that district must have been the primæval "Black Country"—the dark, rich, centre of smoke, noise, and industry. For many miles together the ground was formed of a continuous bed of iron cinder. About Monmouth and Ross must have been the Dudley and Birmingham of Roman Britain. The cinders contained, some of them 40 per cent. of metal, and throughout the last 300 years numerous blast-furnaces in the Forest of Dean had been supplied solely with Roman scoria.

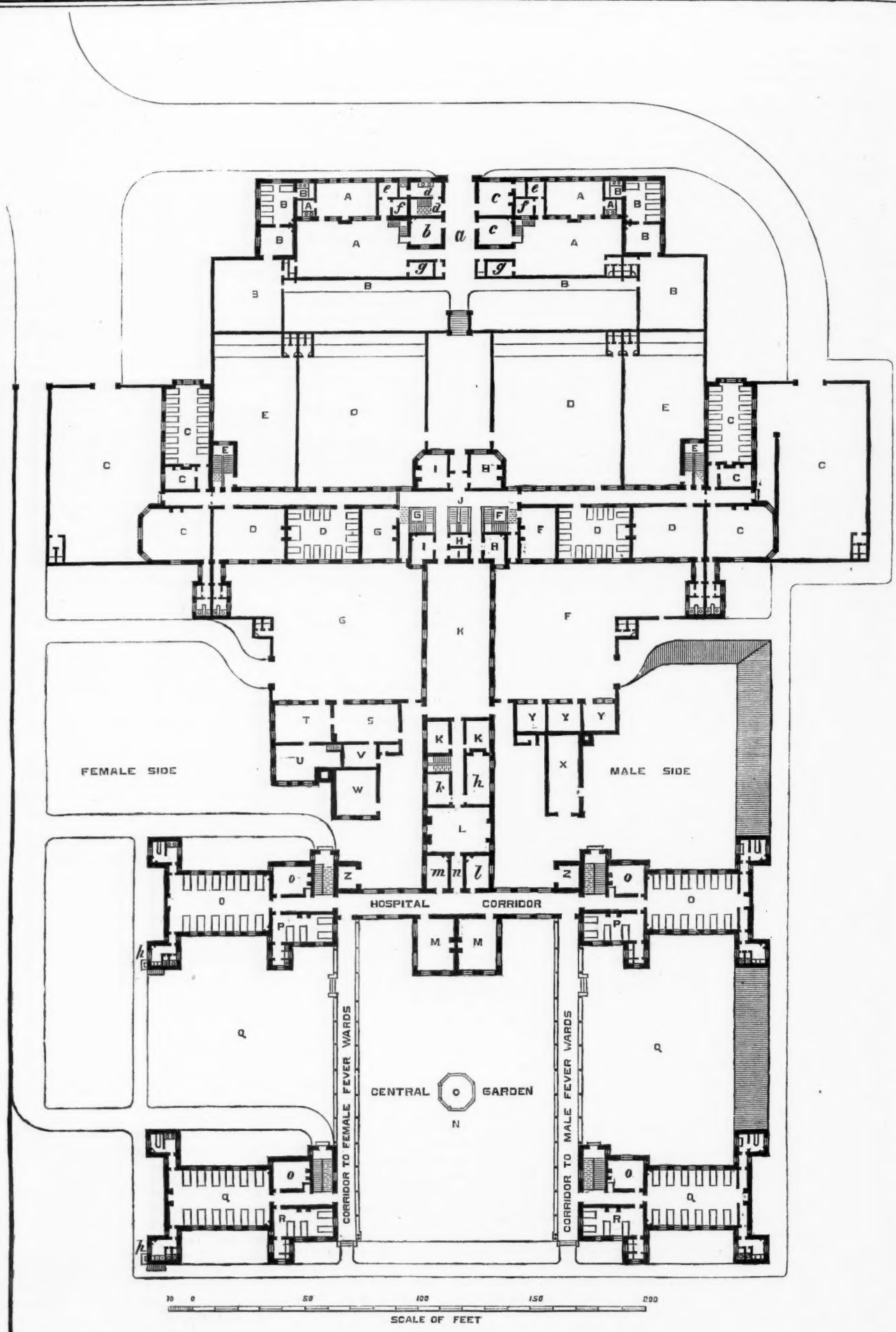
PRESTWICH UNION WORKHOUSE.

A NEW workhouse has recently been erected near Manchester for the guardians of the Prestwich Union. The site, which is approached by a road leading from Crumpsall-green to Blackley, forms a part of the Bongs estate, on another portion of which stands the new workhouse belonging to the township of Manchester, so that the property of the Prestwich Board of Guardians is immediately contiguous to that of the Manchester board, and separated by a boundary wall, erected at the joint expense of the two boards. The site of the proposed building being of a very irregular and uneven shape, has involved a great deal of levelling, and a portion of the ground being very hilly, there has necessarily been a considerable amount of excavation. Portions of the building are erected in a valley down to which the ground has been levelled. The approach road, passing through the grounds, sweeps up to the main entrance, passing on the right the farm belonging to the Manchester guardians. The main entrance is in the form of an arched gateway, on the right of which is the porter's lodge, and on the opposite side is his residence. On the first floor are committee and clerks' rooms, adjoining which is a reception-room for the accommodation of persons having business with the committee or clerk. Passages to the right and left lead to the probationers' ward, with fumigatories, clothing stores for male and female inmates, together with the usual lavatories, &c. Behind these are wards in which patients suffering from skin disease will be required to remain a certain time before being passed into the house. Passing up the central avenue, we come to a flight of steps leading to an elevated platform in front of the main building, which will serve as an airing-ground for the use of the aged and infirm of both sexes, as well as the harmless insane.

Entering the main building are the master's and matron's parlours, which occupy the central front, the windows of their rooms commanding a view of the front part of the building and airing-ground. A central staircase, exclusively for the use of the officers, leads to the master's and matron's bedrooms, which are placed above their sitting-rooms. On the right and left of the central staircase are large stone staircases for the use of the male and female inmates, and adjoining these are wards for the able-bodied, whose sleeping-rooms occupy a corresponding position on the floor above. There are offices for the master and matron situated behind the main staircase, with projecting windows overlooking the rooms occupied by the able-bodied behind, and so arranged (by a small window looking into the dining-hall on each side) as to give the principal officers in charge a thorough inspection of the whole building. The able-bodied, in passing from the day-room to their separate wards, have to pass by the doors of these offices, thus again bringing them under the supervision of the master and matron. There is a door of separation right and left of the principal staircase for the aged and infirm, whose day-rooms and sleeping-rooms are placed side by side on the same level on each floor. The advantage of this arrangement is that probably more than half of this class who could not dine in the general dining-room may live entirely on the ground floor, whilst the more aged and infirm can live on the same level upstairs. The second door of separation at the further end of this passage leads to the wards appropriated to the epileptic inmates on the ground floor, and those for the harmless insane on the floor above. The room for the attendant is placed so that he can conveniently inspect from his window all the dormitories. Special care has been exercised in the arrangement of the water-closets, lavatories, &c., which are divided by a short ventilated passage from the ward itself, so as to admit of a thorough draught of air through the whole. Projecting behind the main building is the dining-hall, with the chapel above, the entrances to which are so arranged as to bring each person under the eye of the master or matron when passing into either of the above-named places. Provision is made for seating about 200 at meals, and this number might be increased if necessary. The kitchen, pantry, bread-store, and other necessary departments are placed behind, and are easy of access to the dining-hall, on the one hand, and to the hospital buildings on the other, the latter being situated in a group at the back. There is a workshop on the men's side, with boiler-house, stabling, cart-shed, and coal-shed. On the female side are washhouses, laundry, foul linen-shoot, bakehouse, coal-shed, &c. At the rear of the domestic offices is a cross corridor, separating the main building from the hospital buildings, which are so placed as to be completely detached from the general workhouse. The hospitals are built on the pavilion principle, there being four pavilions, containing male and female wards, easily accessible to the domestic offices and the surgery. Immediately in front of the kitchen and domestic offices is the convalescent day-room for inmates of both sexes. The wards are two stories high, and have each of them a small scullery, and sleeping-room for the nurse or ward attendant. Each hospital has a hoist, dust-shoot, water-closets, bath-rooms, and lavatories, arranged on a similar principle to those already referred to. Over each water-closet and bath-room is a tank for storing water.

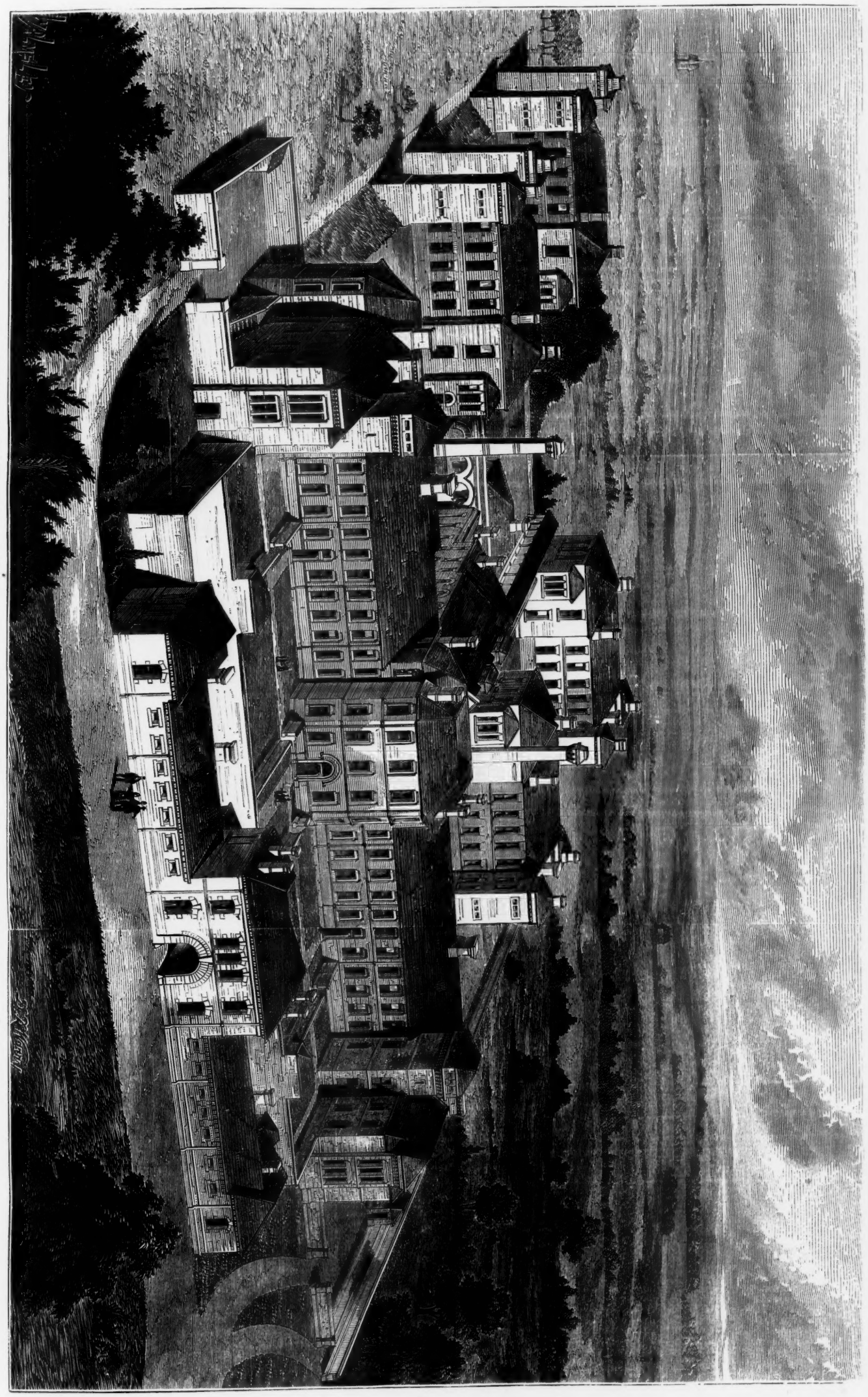
One great object of the architect has been to centralise the administrative department as far as practicable, so as to admit of distribution of food, and facility of supervision to those in charge. Another, and perhaps the principal object, has been to give a liberal allowance of cubical air-space, together with sufficient light and ventilation. As one means of accomplishing this, the pavilion principle has, to some extent, been carried out in the arrangements of the main building, or workhouse proper, in which the long, dark, and ill-ventilated passages usually found in such buildings have been substituted by light, airy corridors. Utility rather than appearance having been the aim of the guardians, the building is very simple in design.

The architect of the building was Mr. Thos. Worthington, of Manchester; and the general contract was let to Messrs. R. Neill & Sons, for 21,775*l*. The foundations formed a separate contract, for 3,250*l*.; and the cost of fittings, land and purchasing, commission to architect and surveyor, road-making, &c., increased the total amount to 37,775*l*.



PRESTWICH UNION WORKHOUSE.—*Plan of Ground Floor.*

A. A. Probationers: ward, yard, bath, &c.; male and female.
B. B. Skin diseases: bed-room, day-room, yard, bath, entrance; male and female.
C. C. Epileptic: bed-room, day-room, yard, attendant; male and female.
D. D. Aged and infirm: day-room, yard, bed-room; male and female.
E. E. Harmless insane: yard, entrance; male and female.
F. F. Able-bodied (males): day-room, yard, staircase.
G. G. Ditto (fem.): day-room, nursery, yard, staircase.
H. Master: office, parlour, closet.
I. Matron: office, parlour, closet.
J. Staircase for master and matron.
K. Dining-hall. L. Kitchen.
M. Convalescent dining-rooms, male and female.
N. Central garden.
O. O. Sick wards: male and female.
P. P. Children's ward: ditto.
Q. Q. Convalescent wards, ditto, and airing-grounds.
R. R. Special wards, ditto.
S. Washhouse. T. Laundry.
U. Washhouse for infected linen.
V. Drying chamber. W. Bakehouse.
X. Boiler-house.
Y. Workrooms: carpenters, tailors, corn-grinders.
Z. Sheds.
a. General entrance. *b.* Reception-rooms.
c. c. Porter's living and bed-rooms.
d. d. Guardians' lavatory and stairs to board-room.
e. e. Padded rooms: male and female.
f. f. Refractory ditto.
g. g. Stove and fumigatory. *h.* Scullery.
k. Stores. *l.* Surgery.
m. Hospital stores. *n.* Serving-room.
o. Ward sculleries. *p. p.* Dust-shoots.



PRESTWICH UNION WORKHOUSE, NEAR MANCHESTER.—Mr. Thomas Worthington, Architect.

ACCIDENTS.

St. Alban's Abbey.—An accident has occurred at St. Alban's Abbey, which is now in process of restoration, under the superintendence of Sir George Gilbert Scott. The great central tower has been shored up and strengthened, and the workmen are pointing the stonework of the exterior, for which several heights of scaffolding have been erected; and while the men were at work on the uppermost scaffolding a portion of it gave way, and four of them fell on to the roof of the nave of the abbey, between 40 ft. and 50 ft. One was severely injured in the spine, in addition to being much bruised. The other men were also much bruised and shaken.

The Wakefield and Barnsley Canal.—The embankment of this canal at Old Mill, near Barnsley, has given way, owing to the water getting through the bottom of the sides. The water flowed into the fields adjoining, and it had to be let out for some distance, in order that the leakage might be repaired.

Dewsbury.—Some foot-passengers at Thornhill Lees observed a large crack in a new grocery establishment opened about a month since, and they gave the alarm. The family promptly left the place. They had hardly got into the street when the whole of the building came down. The stock-in-trade and the furniture were destroyed, and the building was rendered uninhabitable. It is supposed that the foundations had been badly constructed, and that an excavation made near it caused the building to give way.

Oldham.—A fire has occurred at the mill of Messrs. Ogden, cotton manufacturers, near Oldham. The damage is estimated at 30,000*l.* Forty thousand spindles were destroyed. A weaving-shed and warehouse were saved by the firemen. The fire is supposed to have originated by the friction of the machinery.

CHURCH OF ST. JOHN THE BAPTIST, ISLINGTON.

This church, which stands at the meeting-point of Cleveland-road and Almorah-road, Downham-road, was consecrated by the Lord Bishop of London on the 6th of August. The church consists of nave, aisles, chancel, chancel aisles (comprising organ-chamber on the south side and vestry on the north), with bell-cote rising above the chancel arch. There are three porches, one to the vestry, and one to each of the aisles. The style is Early Decorated, and the building is erected of brick, with stone dressings, and tracery. The interior is of brick, ornamented with coloured work, with bands and devices. The chancel is a semi-octagon, with north and south arcades to the vestry and organ-chamber. The nave is separated from the aisles by five bays, having stone shafts and capitals, and bases, and stone arches. The whole has been erected under the superintendence of the architect, Mr. Wm. Wigginton, save the temporary font, which was a gift. The whole cost, including fencing and lighting, will be under 4,000*l.*, and the accommodation is for between 700 and 800. Mr. Heath, of Hornsey-road, is the contractor. A bad foundation and an awkward site increased the architect's difficulties.

REIGATE.

Sir,—Permit me, as a burgess of the borough of Reigate, and a resident there for more than thirty years, to thank you most heartily for your article in the *Builder* of the 10th inst.

Severe as your remarks are, they are but too truly deserved. It is useless for any individual to call the attention of the authorities to the state of things; but I imagine, however much they may chafe under the strictures of the *Builder*, they will find they will be obliged to "move on" now that your eye is upon them.

I do not know, sir, of a more sickening punishment that I could give you than to make you read the reports of the meetings of the Local Board for three or four years past.

You are doubtless aware that Reigate is a borough that some time since was very properly disfranchised for its corruption, and those who were powerful under that *régime* still have great influence in the place, though time will bring in a better class of men, and after a while, I believe, greatly change matters. Unfortunately, at present, few of those who are most fitted for serving in public offices will accept office. I am referring more particularly to the Western Ward, not because they are insensible to their duties as citizens, but because of the strong personality which characterises the proceedings in all municipal matters.

The speculative builder has been allowed to do almost as he likes here, and the consequence is that in spite of stringent by-laws houses have been put up, both large and small, that are a disgrace to the place.

The purchase of a gold chain for the mayor, an address to the Prince of Wales, a squabble between two members of the council, bearding the mayor, or, indeed, any of "the little things that are only big to little men," get plenty of attention; but such a thing as a thoroughly satisfactory inspection of the sanitary arrangements of the houses in the place is out of the question, for who knows but that the first offender might be one of their own council? Heaven forbid that they who make the by-laws should be amenable to them. Under the Public Health Act I trust there will be a means of calling Government attention speedily to the shortcomings of local Boards.

I trust "Gargoyle" will find an opportunity of visiting us again soon, and be able to report progress. I enclose my card.

Salus Populi.

THE DUBLIN TRAMWAYS COMPANY.

At the half-yearly meeting of this company on the 8th inst., a dividend was declared for the past six months at the rate of 10 per cent. per annum, a sum equal, with respect to the period during which the tramway had been opened, to a rate of upwards of 11 per cent. per annum. The report of the directors showed that the number of passengers carried from February to June inclusive reached 979,584, the receipts from which traffic amounted to 11,970*l.*, whilst annexed accounts exhibited total receipts from all sources at 11,970*l.*, working and other expenses leaving a balance of 4,571*l.* as net revenue available for division. The returns are the more satisfactory that up to June 7th only three miles were open, 2½ additional miles being at work from the 8th to the 30th of that month. That this extension will prove eminently profitable was shown by the increase of receipts from 2,681*l.* in May to 3,388*l.* in June. A statement made by the chairman disclosed a further progressive addition to income, the passengers carried in July increasing by 108,563, giving receipts of 4,374*l.* The shareholders seem to have every reason to be gratified with the prospect before them.

NEW MANSION AT THANCKES, IN CORNWALL.

For the last eighteen months or more workmen have been erecting a mansion for Lord Graves, and the works are now so far complete that the family have taken possession. The building has been erected close to where the old house stood, and is situated about half a mile from Torpoint. It is built in the Tudor style, and has been designed by Mr. A. Norman, J.P. The southern aspect commands a fine prospect. The sky-line of the building is broken up by three gables, each surmounted by quaintly-carved animals and birds, which stand out conspicuously against the sky. The carriage-porch is at the south-western end, and from it rises a high tower, which forms a main feature in the general grouping of the building. Upon one angle of this tower is a turret, and upon the one immediately overlooking the drive is carved a life-size figure of a soldier, in the costume of the Tudor period. The billiard-room is semi-attached to the rest of the building, and is situated at the north-west angle. In shape it is octagonal, each cant terminating with a gable, and each gable surmounted by carved figures of birds, squirrels, &c. Over the entrance-porch of the carriage-way are carved spandrels, in which the national emblems are introduced,—the rose, shamrock, and thistle, twisted and entwined together with the oak. The materials used in the building are all of a comparatively local character. The walls are built of native limestone, and the various dressings are in Portland stone, the stone having been selected at the quarries. The hall is wide and spacious, and the upper rooms are reached by a massive staircase, lighted by a large stained-glass window. The contract was taken by Mr. Trevena, of Plymouth, builder. Mr. W. Trevena, jun., has represented his father upon the spot throughout. The carving has been executed by Mr. Harry Hems, of Exeter, and by artists from his *atelier*, under the immediate superintendence of the architect. Mr. Norman has been engaged in making extensive additions to Anthony House, which is situated about a mile from Thanckes. The style of the main building is Classical, and in the design for the extensions the architect has maintained the same character. Mr. John Pethick has carried out the contract.

THE BRIDGE IN ST. JAMES'S PARK.

Sir,—As there are at the present time a number of improvements on hand in the metropolis, perhaps it will not be out of place to notice a want that has long been felt in St. James's Park.

It is utterly impossible for rowers, with comfort, to go under the present bridge, and consequently stooping becomes necessary. Many severe knocks and bruises have been experienced by persons who select the water for an amusement, not a few of which the writer has witnessed.

Could not the bridge be raised at least a foot higher? The expense would not be great, and the gradient would not be so high as to interfere with much of the present surrounding paths.

This would be a great boon to many amateurs who patronise the water. A Builder.

PORTLAND CEMENT STAIRS.

Sir,—With regard to the suitability of Portland cement for stairs, the following fact may be interesting to the readers of the *Builder*. Several flights of stone stairs in the Central Station of this town (Newcastle-on-Tyne), by continual traffic, were worn quite hollow in the centre and the nose worn off, consequently each step was dangerously narrow. This was entirely rectified in the following manner:—The stone of each step was chipped over its face and Portland cement applied in the hollow part, running off to nothing at the ends of the stone, and a nose of cement moulded on; these were supported by a block of wood for a couple of days, then cleared away, and now each step is like a solid piece of stone. R.

HOMŒOPATHIC TREATMENT.

Sir,—Some years ago I wrote to the *Builder* to observe that a certain church tower was out of the perpendicular. The churchwardens thereupon, instead of rebuilding the tower, or having recourse to any expensive engineering process, to rectify the deformity, built two adjuncts, which served an economic purpose, and concealed the defect. Now, as the said tower is built on a site intercepted by numerous springs, one of these is probably the cause of its leaning, and I cannot see a cheaper or more certain remedy than to let down the side *from* which the tower leans to the level of the other side, and this by means of an artificial water-course under the side to be lowered. Suppose the tower to lean towards the west:—Bore some distance from the north and south ends of the east side to a depth lower than the foundation; connect the shafts by a narrow water-channel through the soil, without pipes; pour water in one shaft, and pump it out from the opposite shaft. A settlement will take place too gradually to cause any fear of danger. Of course the tower must be iron-bound during the process. When the tower has levelled itself, in case the water-course is not compressed, and to prevent further sinking, pour in fluid cement or asphalte to fill it up. Walter Scargill.

"UNFAIR COMPETITIONS: BRIGHOUSE."

Sir,—I was greatly surprised on perusing the letter published in the *Builder* of the 27th ult. In it Mr. Payton challenges me to publish my name, and the authority for my statements, which with pleasure I hasten to do, at the same time taking the opportunity of replying to his far from gentlemanly effusion.

The information I acted upon appeared in the *Halifax Courier* of the 20th ult., under the head "Brighouse," and I still fail to see how the statement can be anything but correct, as *each* lowest tender for the various artificers' works was given separately, and the total of the sums (nigh 6,000*l.*) collectively.

With regard to the rival statements in the *Courier* and the *Brighouse News* respectively, I will merely state that the *Courier* is edited by the mayor of Halifax, and is considered one of the best weekly newspapers in Yorkshire.

I still consider that Mr. P. has not at all freed the Brighouse competition from the stigma of unfairness. Even if the statement in the *Courier* (which I forwarded for your perusal) is not correct, which I by no means admit, the fact of the lowest tenders, as per Mr. P.'s letter, being almost one-half more than they ought to have been (as I will shortly prove), in my opinion stamps the competition as unfair.

What would Messrs. G. & P. have said had the lowest tender for the Bradford Town-hall been 60,000*l.*, instead of 40,000*l.*, the amount given as the limit. But "comparisons are odious."

Now to prove that the cost is nearly one-half more than the sum stated as being the limit. If Mr. P. will reperuse the copy of the instructions issued by the Brighouse Local Board, he will find that the 2,000*l.* were *to include* the boundary-walls; so that Messrs. G. & P.'s "estimate was" *not* "in accordance with the requirements of the Board." Of course, I take no cognizance of the reductions

afterwards effected, which must have affected the design as a premiated one.

Your readers may form some idea of the cost of erecting Messrs. G. & P.'s design when I state that in addition to the ordinary cemetery chapels (with tower and spire) mortuary chapels were attached, which were almost as large as the others, and that the entrance-lodge was, if I remember rightly, two stories in height and with bay windows; entrance-gates and 100 yards of boundary-walling were also included. For my own part, and, I may add, in the opinion of competent builders also, the 6,000*l.* named in my first letter was about the sum that would be required to erect the premiated design in its entirety.

I emphatically deny Mr. P.'s insinuations that we were competitors in the competition referred to, and with regard to the affronts Mr. P. pleases to heap upon me I will say nothing, trusting he will have the good sense to apologise for them. As before, "I leave your readers to draw their own conclusions." J. Leeming.

Halifax.

REMOVAL OF DUST AND TRADE REFUSE.

At Lambeth Police-court, Mr. Ellison has given his decision in the case of Messrs. Chubb, the lockmakers, against the Vestry of Camberwell parish as to the removal of ashes, &c., from their iron safe works. Mr. Goddard was counsel for Messrs. Chubb, and Mr. E. Clarke for the Vestry. Counsel referred to the case of "Lindon *v.* Stanbridge" (26 *Law Journal*, Exchequer Reports). Mr. Ellison, after a discussion and some evidence, gave his opinion on the question raised. It was whether the substances were trade refuse, or such as the parish was bound to remove. Of course dust and ashes, the produce of domestic purposes, should be removed, and that which was produced by the forges, &c., used in manufacturing purposes, was to be considered "trade refuse," and the parties themselves to have them removed. The two substances should be kept distinct. He considered that the case in the *Law Journal* supported the view of the case he had arrived at. It was arranged that a special case should be submitted to the Superior Court for decision.

ROYAL AGRICULTURAL SOCIETY: CARDIFF MEETING.

It seems fifty-six sets of plans and detailed estimates were sent in competition for two prizes of 20*l.* and 10*l.* for the first and second best design for a pair of agricultural labourers' cottages, the cost not to exceed 220*l.*; and two similar prizes for the first and second best design for a pair of miners' cottages, to form part of a row, no single cottage in which was to cost more than 90*l.* The three land surveyors who were appointed judges pronounced them all devoid of merit, so no prize was awarded; and as each set of plans was accompanied by an entrance-fee of 10s., the society appears to have adopted a smart way of strengthening their funds. A Subscriber.

PROTECTION OF IRON.

Sir,—I can strongly advise your correspondent "H. J. P." to make a trial of Astbury's oxide of iron paint for the protection of all kinds of ironwork. It lasts longer than any other composition, and has a good appearance for years. I trust these lines will be of service to the manufacturers of the article in question. M. A.

THE BURSTING OF TURNMILL-STREET SEWER.

CLERKENWELL VESTRY *v.* METROPOLITAN RAILWAY COMPANY.

The action brought by the Clerkenwell Vestry against the Metropolitan Railway Company to recover the sum of 1,854*l.* damages and costs already awarded by arbitration for injury done to the Turnmill-street sewer, by the company's works, came on for hearing before Baron Martin and a special jury, at Guildford, and the whole subject seems to have been gone into again as if no arbiters' award had ever been made.

Among the witnesses were Mr. S. Bevan, Chief Surveyor of the Vestry, and Mr. C. H. Gregory, C.E., who stated that in their opinion the formation of the railway works preceded the failure of the sewer. Mr. Moreton, C.E., under whose superintendence the railway works were done, maintained the contrary, or, at least, that the damage was not caused by the cutting of the railway; and Mr. B. Baker, Chief Assistant Engineer to Mr. Fowler, corroborated this view.

Baron Martin, in summing up, said: The arbitrators were appointed in this case to ascertain to what extent the plaintiffs were injured, or whether they had been injured at all. As they did not agree, Mr. Clutton was appointed as umpire. I do not know him, but I have understood that he is one of the most eminent men in the kingdom, who has been employed in these things for many years. Mr. Clutton, in this document, after reciting the appointment of arbitrators on either side, and stating that he had taken the oath before a Justice of the Peace, makes an award of 1,640*l.* as the amount to be paid by the Metropolitan Railway for injuriously affecting, by the execution of their works, the sewer of the plaintiffs. So that there is Mr. Clutton making this award, after having viewed the premises and seen all the witnesses. Therefore, it is as plain as the sun at noonday, notwithstanding all that the counsel says, that he decided that the Company had done the damage. I believe there was a mistake in this Act of Parliament, which meant that the money should be paid as a consequence of the award being given; but the lawyers found out that it was necessary to bring an action to get at the money, and they, therefore, come here to deny the very thing that Mr. Clutton has affirmed. They fling the whole of that away, and try the case over again, and tell you you are told to listen to nothing but the evidence given to-day. In the first place the plaintiffs call the surveyor, who must of course be prejudiced, but who gave his evidence very well. Then, however, they call Mr. Gregory, an independent man, and one of the most eminent men in the kingdom, who tells you that the injury was caused by the works. Whom does the other counsel call? He calls all the servants of the company, who are bound to come here and swear it was their fault. Mr. Clutton heard it all, and decided against them. I have nothing more to add, except that it is most extraordinary after the taxed costs are fixed at 250*l.* on one side, when they must be just as much on the other side, and when the costs altogether cannot be less than 800*l.*, that you should be called upon to try the thing over again, and enable this railway company to keep the money still longer from these people.

The jury at once returned a verdict for the plaintiff for the full amount.

Mr. Day handed in a bill of exceptions to the judge's ruling.

HINTS HOW TO USE A GRINDSTONE.

Mr. T. E. Mitchell, in the *Journal of the Franklin Institute*, says,—

1st. Do not waste the stone by running it in water; but if so, do not allow it to stand in water when not in use, as this will cause a soft place.

2nd. Wet the stone by dropping water on it from a pot suspended above the stone, and stop off the water when not in use.

3rd. Do not allow the stone to get out of order, but keep it perfectly round by the use of gaspipe, or a hacker.

4th. Clean off all greasy tools before sharpening, as grease or oil destroys the grit.

5th. Observe — when you get a stone that suits your purpose, send a sample of the grit to the dealer to select by: a half-ounce sample is enough.

CHURCH-BUILDING NEWS.

March.—The new church of St. John, in the town of March, and Isle of Ely, has been consecrated by the bishop of the diocese. The new church constitutes another,—although, as yet, small,—landmark in the wide expanse of the Fen country, and at the same time adds a useful ornament to the town of "the avenue of elms." Until recent years, the township of March was comprised, for ecclesiastical purposes, within the rectory of Doddington. The Church of St. John consists of nave, small side aisles, and chancel,—provision being made at the chancel end for organ and vestry. The style belongs to the early part of the fourteenth century. It has not been thought necessary at present to build a tower, but there is a small turret surrounded by a flèche or bell-tower. The walls consist of Ancaster stone, with Bath stone dressings, and the roof is covered with Colly Weston slate. The building is erected on a tolerably good foundation for the district, although a good deal of concrete had to be employed under the walls. There are four arches on either side of the nave, supported by stout stone pillars, with carved capitals; the chancel-arch resting on short marble columns, and stone corbels. The roof is an open one, with timbers stained and varnished; and the seats which are open, are made of pine, also stained and varnished. The main entrance is the porch at the west end of the south aisle, but there is also a smaller doorway at the extreme west end of the north aisle. The chancel is paved with Maw's tiles, by Mr. Simpson, of London; and the aisles are laid with black and red Staffordshire tiles. The three-light window at the east end awaits stained glass, in memory of the late Sir Algernon Peyton, bart. The work is being executed by Messrs. Clayton & Bell. At the west end there are two two-light windows, which (in common with those in the aisles) are at present filled with cathedral glass. There are stalls in the chancel for the choir; and the pulpit is made of alabaster, with open arches. The chancel is raised three steps from the centre aisle, and that part within the communion-rail is raised a similar distance from the chancel-floor. The stone carving throughout has been executed by Mr. Sanson, of London. The heating apparatus was supplied by Mr. Hayden, of Trowbridge. The church, which will accommodate 400 persons, will cost above 5,000*l.* The architect is Mr. T. H. Wyatt, of London, president of the Royal Institute of Architects. The work has been carried out by Messrs. Holland & Hannen, builders, under the supervision of Mr. Fowles, as clerk of the works.

Charlton.—This is a hamlet in Fladbury, and forms part of the living of Cropthorne. Mr. Workman has purchased and considerably improved the Charlton Estate. Casting about him for a suitable site for a new church (now opened), it occurred to him that a spacious barn on the estate, which, from its substantial character and style of building, seemed almost originally to have been intended for both purposes, would form the nucleus of a church such as the village required; and thereupon, acting on his own ideas, he proceeded, with the aid of Mr. Forsyth, of Worcester, to convert the building into a church. The work of conversion commenced early in September, 1870, and has been steadily proceeded with up to the present time, the builders being guided by neither plan nor estimate. The large doorways of the barn, which gave room for the entrance of the grain crops off the estate, have been built up with masonry, and the building "rendered church-like" by the insertion of windows of the fourteenth-century style. There are eight of these windows, principally single-light; but in the east window something more elaborate has been attempted. This window has three lights, with tracery heads, and is filled in with stained glass, the principal subjects being "The Ascension," "The Good Shepherd," and "Christ Blessing the Children." Over this window is a quatrefoil light, geometrically traced, filled in with stained glass, bearing the sacred emblems of the four Evangelists. The side chancel windows are also filled in with stained glass, and bear the figures of the Evangelists. The eight single-light windows are filled in with plain glass, with coloured bordering and centres for relief. The roofing of the barn was found to be in such a state of repair that little was required to be done to it. On the gables, however, of the building floriated crosses have been erected, and there is a bell-turret, with bell. The church consists of nave and chancel. Entrance to the building is obtained by a porch at the west end, which is an addition to the old building, and is built of the same material as the old walls, with Bath stone copings and dressings. The arch of the porch is wrought with coloured and Bath stone alternately, and there are carved capitals on each side of the doorway. The inner doorway is of Bath stone. The interior of the building has an open-timbered roof,—the original roof of the old structure, which has been rendered more in character with its new purpose by small spandrels having been brought down on each side to carved stone corbels on to the principals, and the whole being stained and varnished. These corbels are all alike, with the exception of the two showing the limit of the nave, which are carved figures representing angels. The others are conventional subjects. The chancel is decorated with a border of ornament and devices, on each side of the east window being a vine, the rest of the wall being decorated with a pattern of *fleur-de-lys*. The splays of the windows are filled in with devices of roses, lotuses, and other flowers. The stalls, altar-rails, and sedilia are of pitch-pine, with black columns for relief, with carved pateræ and angles. The altar-rail has iron standards, picked out with gold and colour, and the floor of the sacrarium is laid with encaustic tiles, supplied from the works of Mr. Godwin, at Lugwardine. The floor of the porch and part of the nave are laid with a plainer pattern of tile. The west gallery is constructed of pitch-pine, with carved capitals and dark columns, corresponding with the stonework of the porch. The pulpit is of Caen stone. The building will seat about 250.

York.—Mr. Street, the architect who has charge of the restoration of the Minster in this city, has visited York, and inspected the progress of the works. It was originally thought that the roof of the south transept would have to be bodily raised by hydraulic power, and towards this end the shoring of the lower roof was finished some time since. The outer roof is now being stripped of the large Westmoreland slates with which it has hitherto been covered, and it is found to be in good condition. The object of raising the roof would have been to have drawn it in; but it is found that the bulging outward has been slight, and that, as a consequence, there is little to do in this respect. As soon as the whole of the slates are off, boarding of the roof will commence, in readiness for covering it over with lead. The two turrets at each side of the south entrance will be taken down, and substituted by wooden ones, to try the effect, before rebuilding them.

Ashbocking.—All Saints' Church, Ashbocking, which in part of the present fabric is of the twelfth century, has been recently under repair, at parish cost, to save the walls from falling in. A desire is strongly felt to complete the restoration on a very simple scale under Mr. E. C. Hakewill, who has undertaken it. The stonework of the window, &c., which is of the thirteenth century, is much decayed. There are also other details much needing immediate care. The works are in the hands of Mr. H. Luff, builder, Ipswich.

Boldon.—The ancient parish church of Boldon, near Sunderland, having become very dilapidated

during the past few years, a movement has been recently set on foot to restore the interior. The old church is generally supposed to have been erected about the eleventh century. The edifice is in the Early English style, though much of the beauty and simplicity has been defaced by the process of repairing and furnishing pursued by the church authorities of last century. It is intended to remove these deformities, and to this end it has been determined to clear away the present galleries, and substitute open seats for the present square pews. To effect these and other improvements which it is proposed to make, it is estimated that a sum of 1,000*l.* or 1,200*l.* will be required.

Mortomley.—The Parkin Jeffcock Memorial Church, at Mortomley, has been consecrated by the Archbishop of York, in the presence of a large assembly, including the principal families of the neighbourhood. With the circumstances attending the death of Mr. Parkin Jeffcock the public are familiar, and it need only be said that while heading a band of heroic men, after the explosion at the Oaks Colliery, in December, 1866, another explosion took place, and he and those who were with him perished. He had often desired the erection of a church at Mortomley, for the benefit, more particularly, of the miners, in whom he took a deep interest; and when a memorial to his memory was contemplated, it was decided to erect a church, according to his desire. A fund was opened, and in a short time over 2,000*l.* were raised. The Jeffcock family gave 1,000*l.*, including the site, of the value of 200*l.*, and among the subscribers were Earl Fitzwilliam and Lord Wharncliffe. The church, which is known as St. Saviour's, is situated close to Mortomley Hall, and is built in the style of architecture prevailing in the thirteenth century. The nave is 48 ft. by 20 ft., the chancel 28 ft. by 18 ft., and there is a north aisle, organ-chamber, and vestry. The roof is of open stained timber, and the height is 43 ft. The seats are open, and of stained wood. The church will accommodate 300 persons, and the total cost is about 1,900*l.* It will be heated by hot water. The pulpit is of polished marble, and that and the chancel-screen are the gift of Mrs. Jeffcock. The font is the gift of the Rev. G. Brewin, of Wortley. The very handsome altar-cloth is the work of Mrs. Gainsford. Miss Marriott, Mrs. Hutton, and Mrs. Burges have also contributed towards the decoration. At the north end of the church is a brass tablet, containing the following inscription :—

"To the glory of God, and in pious remembrance of Parkin Jeffcock, who lost his life with an exploring party on the 13th December, 1866, in the Oaks Colliery, near Barnsley, after the great explosion there on the previous day, this church, free to all, and dedicated in the name of the Saviour of the world, is offered by his surviving parents, his brother, and many friends, on the 7th day of August, in the year of our Lord 1872."

The architect was Mr. James Brookes, and the contractors were Messrs. Longmire & Burge. A part of the contract was carried out by Messrs. Vincent & Broadbent. Mr. Masters acted as clerk of the works.

Bromsgrove.—The architect of the new church here is Mr. J. Cotton, of Birmingham. Mr. Horton, mentioned in our account last week as the architect, is a member of the building committee only.

DISSENTING CHURCH-BUILDING NEWS.

Wellingborough.—The memorial-stone of a new Wesleyan chapel and school has been laid here. The total amount of subscriptions is nearly 1,200*l.* The site for the new chapel is on what is known as the Park Estate, and that part of it which is fast becoming one of the most important parts of the town. The proposed chapel is designed in the Italian style, freely treated. It will be entered from the front by an open arcaded porch, supported by columns with carved caps, and over the arches diaper-work will be introduced. On either side are two turrets, containing gallery staircases. The body of the chapel is divided by two wide aisles, and sittings are provided for 400 persons, and, with 300 in the galleries, makes a total of 700. A roomy rostrum will be used, and a recess in rear of it is placed to give room and effect. Behind the chapel are three vestries, two communicating, which can be made into one large room. The schoolroom is behind them, and is 26 ft. by 39 ft., well lighted and warmed, and has an open roof. Close to it is a kitchen, and in convenient positions are lavatories. The architect is Mr. Charles Bell, of London, under whose direction it is being built by Messrs. Barton & Reach, of Rothwell. Mr. Blunt, of Wellingborough, is clerk of the works. The estimated cost is a little over 1,800*l.*, to which are to be added 500*l.* or thereabouts, for the purchase of the ground.

Lightcliffe.—A Congregational church has been erected here in the Geometrical Decorated style, from the designs of Messrs. Lockwood & Mawson, architects, Bradford. The cost has been 8,500*l.* The edifice stands on a gentle eminence at a short distance from the Lightcliffe Railway-station. The tower and spire, rising to a height of 150 ft. from the ground to the top of the finial, has just been completed. Sir Titus Salt has given the turret-clock and bells, which cost 750*l.*; Miss Salt has expended 130*l.* on the pulpit, communion-table, and choir-benches; and Mr. George Salt defrays the cost of the organ and case, 700*l.* The organ is to be built by Mr. Holt, of Wakefield, under the management of Mr. Samuel Smith, of Bradford, a musical amateur. Inclusive of the gifts of the Salt family, the amount expended on the church will exceed 10,000*l.*

Great Boughton, Chester.—The memorial-stone of a Congregational chapel has been laid here. The site is the corner of the new street between the Christleton and Tarvin roads, and near to the present chapel, which it is intended to utilise as a schoolroom. So soon as the amount given or promised towards the new chapel reached 1,000*l.* an architect, Mr. T. M. Lockwood, was appointed, and the contract of Mr. W. Andrews, another citizen, to build it for something less than 1,800*l.*, was accepted. Probably with the cost of the land and extras, the total will be 2,300*l.*, and it would have been at least 2,500*l.* had the first design, which included an open octagonal turret at the south-west corner, been adopted. The dimensions of the new chapel will be 68 ft. by 38 ft. 6 in. inside, and access will be had from the Christleton-road through a vestibule with inner porches, 6 ft. in width. The height inside is 29 ft. to the ceiling, and to the ridge 42 ft., there being a triangular space left in the roof for ventilation. The roof is open for half its height, showing its construction internally. Accommodation is provided for 463 sittings, the seats being open, with sloping backs. The windows will be glazed with lead lights, filled in with tinted glass. The woodwork of the interior will be chiefly of pitch pine, the pulpit being placed on a raised dais under an arched recess. The general style of the building is Early English, the walls being of brick with stone dressings. The front is to have a large three-light window, with carved caps and columns, while below it will be the entrance to the building by means of two arched doorways, with carved capitals and granite shafts. In the upper part of the gable is a circular louvre, and the apex is surmounted by a bell-cot of simple design. The side windows consist of double lancet lights between the buttresses, finished internally with carved capitals and stone shafts. The heating will be effected by means of Porritt's patent hot-air apparatus, and ample provision is made for ventilation.

West Bromwich.—The opening services in connexion with the new Wesleyan Chapel, recently erected in the Beeches-road, have been performed. The new building is situated close to the Birmingham-road, and forms a conspicuous object in the most fashionable suburb of the town. The chapel is designed in the Grecian style of architecture. Exteriorly it is faced with Kingswinford bricks, with Bath stone strings, quoins, cornices, pediments, &c., the stone being enriched with carving and incised decorations. The interior walls are relieved with Ionic pilasters, and over each pilaster are acroteria ornaments, from which spring the moulded ribs dividing the coved ceiling panels. A gallery is provided at the entrance, and a rostrum and pulpit opposite. The arrangements for warming and ventilating are complete. The architect was Mr. Edward Pinches, of West Bromwich, and the builders were Messrs. Trow & Sons, of Wednesbury. The cost, including land, will be about 2,600*l.*, of which 800*l.* remain to be raised.

Bensham, Gateshead.—The foundation-stone of a Wesleyan new chapel has been laid at Bensham. The site is near St. Edmund's Cemetery, Gateshead. The new chapel will immediately adjoin the schoolroom. The new edifice is situated on the west side of the road leading to the Redheugh Bridge. The dimensions of the building are as follows:—Length (including 20 ft. which will be set apart for the choir), 70 ft.; width, 46 ft.; and height, 32 ft. The new chapel will be built in the Italian style of architecture, and will accommodate between 800 and 900 persons. The walls will be built of Low Law blocking and Prudham stone, and will, in the winter, be heated with hot water. The architect is Mr. F. R. N. Haswell, of North Shields, and the contractor is Mr. J. F. McMurtrie, of Gateshead. The site has been purchased from the Askew estate, and the total cost of the building is estimated at 6,000*l.*

Denton.—A new Wesleyan chapel has been opened here for divine service. The style of architecture is Gothic, and, together with the arrangement of the plan, is upon the model of another chapel recently erected from the designs of the architect (Mr. George B. Ford, of Burslem). The accommodation provided is for nearly 600 persons on the ground floor, and in the gallery across one end; and at the opposite end of the chapel is an orchestra, underneath which is a large class-room, and adjoining this is a minister's vestry and lavatory, with closet attached. In securing the site sufficient land was purchased for the erection of schools, which are to be built forthwith. The works have been carried out by Mr. Stringer, of Sandbach, from the designs and under the superintendence of Mr. Ford, the architect. The cost of the building and fittings is about 3,400*l.*

Wheelock.—The chief stones of a new Wesleyan chapel and school have been laid here. The site of the new chapel is in a central position, opposite the present chapel and school. The school will be underneath the chapel, which will seat 406 persons, the school and class-rooms affording accommodation for 500 scholars. The plan of the chapel is an oblong, with a gallery and orchestra, and the style of architecture is Gothic freely treated. Both the chapel and school will be well lighted and ventilated. The chapel roof will be in one span, to avoid obstructions to sight, and the floor of the chapel will be higher at the entrance than at the pulpit end, to prevent obstructions to sight when the congregation are seated, and this is obtained without steps. The vestibule will be laid with encaustic tiles, supplied by Messrs. Malkin, Edge, & Co., of Burslem, and the building is to be warmed with hot air. The contract for the buildings and fittings, which also includes railing, gates, and boundary-wall along the front of the site, but exclusive of warming, has been undertaken by Mr. William Martin, builder, Haslington, for 1,730*l.*, and will be carried out under the superintendence of the architect, Mr. George B. Ford, of Burslem.

Hanley.—The memorial-stones of a new Wesleyan Chapel have been laid, with the customary formalities, at the corner of Rose-street and Keeling's-lane, opposite to the National Schools. Messrs. Scrivener & Son, of Hanley, architects, prepared the plans. The design is Gothic, and the chapel, which will be 60 ft. long by 33 ft. broad, will accommodate 300 persons. There will be a school-room underneath, of the same proportions. The building will be of blue and red brick, with stone dressings, and the roof will be of red and blue tiles, ornamentally arranged. The chapel will be seated throughout with open benching, stained and varnished. There will be an open-timbered roof, and a gallery at one end. The windows will be filled with tinted glass. Two vestries and a porch-entrance will be provided. Mr. R. Hammersley, of Bucknall-road, has undertaken to erect the building for 1,355*l.*, and towards this sum the committee had secured 938*l.* before the laying of the memorial-stones.

SCHOOL-BUILDING NEWS.

Charlton Kings.—Mr. Higgs having determined to build a school suitable to the growing requirements of this parish, the foundation-stone of a building capable of accommodating 200 children has just been laid. The site, which is given by Mr. Higgs, together with 1,000*l.* to the building-fund, is adjacent to the Church of the Holy Apostles, and the architectural character of the building will be in keeping with that structure. Messrs. Middleton & Goodman are the architects of the new building, and Mr. Daniel Hawkins is the builder.

Saltaire Literary Institute.—We understand that this building, erected by Sir Titus Salt, bart., is closed, for the purpose of decoration. The style selected is Pompeian. The execution of the work is intrusted to Mr. Henry Briggs, of Bradford, from designs by Messrs. Lockwood & Mawson.

STAINED GLASS.

Doncaster Parish Church.—The west window of this church is to be filled with stained glass, by Sir Isaac Morley, of Beechfield, as a memorial of his late wife, Lady Morley. The execution of the work has been placed in the hands of Messrs. Ward & Hughes, but the design will be first submitted to Mr. Gilbert Scott.

Free Church, Sighthill, Glasgow.—A stained-glass window has been prepared for this newly-erected church. The window is a memorial of the late Mr. William Collins, the founder, in 1834, of the Glasgow Church Building Society. The leading incident in the life of the good centurion has been selected for illustration. The centurion said he was not worthy that Christ should come under his roof, but let Him speak the word and his servant would be healed; on which Christ said, "I have not found so great faith, no, not in Israel." The illustration occupies the three upright lights in the window. The dexter light contains three of the elders of the Jews accompanying Christ to see Him restore the sick servant to health; the centre lights represent Jesus met by two of the centurion's servants, and in the sinister light is seen the centurion tending his sick servant. Messrs. Ballantine, of Edinburgh, are the artists.

Stoke Fleming Church.—Painted glass has been placed in the east window of this church, to the memory of the late Mr. Samuel Juaniz-y-Echalaz Clark. The subject is the Ascension,—a difficult one to treat successfully in so confined a space. The window has been made by Messrs. Ballantine, of Edinburgh.

Wellingborough Church.—The Decorated east window of this church has been filled in with stained glass, — "In commemoration of the thirty years' ministry of Canon Broughton as vicar, A.D. 1871." The window is one of five lights of varying width, with flowering tracery in the upper portion. The subject chosen for illustration is the "Crucifixion." The central light is filled with a life-size figure of the crucified Saviour, with the Virgin Mary and the Magdalen at the foot of the cross. The lights to the right and left of the central one are filled with pictures of the two thieves, the beloved disciple and others finding a place in the lower part of the design. In the extreme side lights, the centurion and soldiers with the Roman standard have been represented, some of the soldiers on horseback. The chief part of the tracery is filled with figures of angels. The window has been erected at the expense of the parishioners of Wellingborough, and is the work of Mr. A. Gibbs, of London.

Carlisle Cathedral.—A new window of stained glass has been inserted in the west end of the nave of this cathedral to the memory of the late Canon Harcourt. The style of the masonry is Gothic, and it consists of five lights. The subjects represented in the window are all Scriptural and religious, but so limited is the space that in only one case do they comprise more than two, or at most three figures, and in many instances they are simply portraits. This gives the design of the window some poverty of effect. The central and principal subject is a portrait of Jesus. The work has been executed by Messrs. Hardman, of Birmingham.

Bath Abbey Church.—Mr. Murch, says the local *Chronicle*, has every reason to congratulate himself on the success of his proposal for filling the east window of the Abbey in a manner worthy of the structure, the rest of the work of restoration, and the city. From a circular which he has just issued, we learn that in place of the fifty subscriptions of ten guineas each which he thought he might venture to ask, he has received besides a few larger and many smaller subscriptions no less than fifty-seven several sums of ten guineas, the entire amount promised to him up to this time being 930*l*. To carry out the plan of the committee with whom he is associated for the purpose a further sum of 220*l*. is required. Messrs. Clayton & Bell have the execution of the work, which it is intended shall represent, in a series of seventy-six pictures, the life of our Lord from the Annunciation to the Ascension. The arrangement has the sanction of Mr. G. G. Scott.

Bengeworth New Church.—This church is progressing. The stained-glass east window, for which a special effort has been made, is being inserted. This window has been prepared by Mr. W. H. Constable, of Cambridge. It portrays Aaron, St. Paul, Christ, St. Peter, and Moses.

Minster Church, Thanet.—Two painted glass windows have recently been placed in the west-tower end of this church, to the memory of the late Mr. William Rogers, of Sheriff's Court, in the parish of Minster. They have been executed from the design and under the superintendence of Mr. Seddon, of Westminster, the architect of Mrs. Tait's Orphanage and of St. Peter's Church, Thanet, by Mr. J. R. Thompson, of Southwark. They represent the figures of the Virgin Mary, with the infant Saviour and St. Joseph, standing under conventional canopy-work. The background of one of the windows is a ruby, and of the other a deep green, and the prevailing colours in the border are respectively counterchanged.

Halesworth Church.—A stained glass window has just been placed in the south aisle of this church, in memory of the late Mr. Patrick Stead, formerly a merchant of this town. His widow presents the memorial. Mr. H. Hughes was the artist. The principal figure is the Ascension of our Saviour.

St. James's, Gateshead. — A stained glass window has been erected in this church in memory of the late Colonel Henry C. Allhusen, of the 1st Newcastle Artillery Volunteers. The work was designed and executed by Mr. Henry M. Barnett, glass-stainer, Newcastle, and cost upwards of 160*l*. The window illustrates three Scriptural subjects. The centre and two southern lights are taken from Luke vii. 1—10, and the two lights in the north side are from the Acts of the Apostles x. 1—4. The upper rose of the window illustrates the Resurrection, and the two intervening roses the coats of arms of the family and the corps of which the deceased gentleman was the commanding officer.

PATENTS CONNECTED WITH BUILDING.

Hasp or Latch.—*R. Dempster.* A communication. Dated 21st July, 1871.—This invention consists in constructing a hasp or latch, called "the safety hasp or latch," of a combination of three principal parts, first, a hasp or latch piece proper of the usual hook or other form; secondly, a bolt attached to that part of the hasp or latch which extends between the eye and the hook, or the equivalents of the eye and hook, or either of them; and, thirdly, a spiral or other spring, to act upon the above-mentioned bolt and keep it pushed out, but also allowing it, when pressure is applied, to recede. To facilitate the passing of the hook over the staple or fixed piece, the end of the bolt is formed with a curved lip.

Window Sashes.—*S. Rogers.* Dated 22nd July, 1871.—Into the pulley stile is let a case containing a ratchet-wheel with a steel spring and a pawl working in the teeth of the said ratchet-wheel connected by a rod to a handle, around which rod is coiled a spiral spring, and projecting from the said case and leading to the inside lining is an arm. Into the back of the sash is fixed a rod of iron or other material, with teeth thereon to correspond to the teeth of the ratchet-wheel. When the window is required to be opened, pull the said handle or knob, which releases the ratchet-wheel, and raises the sash upwards, the sash being stopped at any position by the handle or knob being let go. The sash is lowered by hand in the usual way.

Paving or Flooring for the Stalls of Stables.—*J. L. Norton.* Dated 22nd July, 1871.—According to this provisional specification metal frames are employed having cells in them to be filled up with asphalte, wood, moulded blocks, bricks, or tiles. Between the cells or through the blocks holes are formed for the passage of moisture or dirt.

Longitudinally Corrugated Iron Beams.—*R. Montgomery.* Dated 30th November. — This relates to improvements in the shape of the ingot to be used in the manufacture of longitudinally corrugated or folded beams. The invention consists in casting the ingot in a mould so fashioned as to form or produce longitudinal grooves in the ingot, corresponding in their number and relative position with those required in the finished beam or rail. To convert the ingot thus formed into a beam, bar, or rail, it is passed at a proper heat through a rolling-mill provided with a series of finishing grooves, the first of which correspond very nearly with those of the ingot. The invention also relates to the combination of bars of a peculiar shape in the formation of a "pile" for the production of a longitudinally corrugated beam or rail of iron, and consists in forming a "pile" having the same shape as the bar thereby produced, from which, with the same rolls and the same number of passes a perfect beam is manufactured.

Books Received.

"Work and Wages Practically Illustrated. By Thomas Brassey, M.P. Bell & Daldy." This interesting volume, which has a preface by Mr. Arthur Helps, and is dedicated to Mr. Thos. Hughes, M.P., will receive attention in due time.——"Specifications for Practical Architecture: a Guide to the Architect, Engineer, Surveyor, and Builder. With an Essay on Building, on the basis of the work by Alfred Bartholomew. Thoroughly revised, corrected, and greatly added to by F. Rogers. Sprigg, Atchley, & Co." We gladly welcome any republication of the late Alfred Bartholomew's Essay, now out of print in its original form, and hope this volume may in consequence be studied. But if we are called upon to express an opinion as to the way in which the present editor has done his work, it will not be very complimentary. Mr. Rogers claims in his preface to have adapted the book to modern science and requirements, and indicated the use of new materials. When we say that the specifications are described as for a "fourth-rate" house, a "third-rate" house, a "first-rate" house, a mode of description (belonging to an extinct Building Act), which is no longer recognised, and that the specifications do not contain a single word as to the use of Portland cement concrete, the extent of the trouble which has been taken to fit the book for the present day will be obvious to the meanest capacity.——We simply note, at all events for the present, the publication of "A Treatise on Mathematics, as applied to the Constructive Arts. By Francis Campin, C.E." (Sprigg); "Practical Plane Geometry, giving the simplest Modes of constructing Figures contained in One Plane. By J. F. Heather, M.A." (Lockwood & Co.); and "Perspective, or the Art of Drawing what one sees explained and adapted to the Use of those Sketching from Nature. By Lieut. W. H. Collins, R.E." (Longmans & Co.).

Railways or No Railways. By Robert F. Fairlie. London: Effingham Wilson. 1872.

The narrow-gauge Fairlie system is now well known both in Europe and in America; and the purpose of Mr. Fairlie's volume is, of course, to advocate that system as against the broader gauges. His narrow gauges, he maintains, combine economy with efficiency, while the broader gauges are both costly and extravagant. We have thus a revival of the old battle of the gauges under a new form; for what was formerly called the narrow gauge, which overcame the broad, is now ranked with the broad as against the still narrower Fairlie system. The British and other railways are like a tree which has not yet thrust forth its leaf-loading twigs; and what Mr. Fairlie wants, we presume, to do is to send the railway ramifications into every wealth-yielding corner of the country to develop its multitudinous resources, and gather them all into the main branches and trunks of the railway system as already formed. And for such a purpose certainly narrow gauges and Fairlie engines and other vehicles seem better adapted than the present ponderous system, which is practically defective, and ever must be.

Miscellanea.

Memorial Reredos in Dorrington Church. This church has been improved by the addition of a rerodos, executed in Caen stone, which extends across the east end of the chancel. The reredos, which is a memorial of Mr. T. H. Hope Edwardes, consists of a carved central subject, representing "The adoration of the Kings." On either side, in niches, are figures of St. Edward the Confessor and St. Andrew, in whose honour the churches of Dorrington and Condover are dedicated. Devonshire marble shafts, with carved capitals, also a carved cornice and diapers, help to further enrich the central part of the reredos, which is exactly the width of the east window—raised by the officers and rank and file of the 5th company Shropshire Rifle Volunteers, in memory of Mr. W. J. Hope Edwardes, the spaces north and south being filled up by arcades, having carved capitals, marble shafts, and carved panels. The sculptor was Mr. T. Earp, Lambeth, who executed the whole of the work. Mr. Edward Haycock was the architect.

Terra-Cotta Works at Watcombe.—Having passed through the biscuit-oven the object is ready for the beautifully delicate colour which appears upon some of the ware: a result of the application, by hand, of glazes and enamel. Some small figures, such as butterflies, are printed from copper-plates on thin paper, and applied in the ordinary way to the object to be ornamented; which, being subjected to heat, the paper is destroyed, and the colour and markings remain. Then, when the ornamentation is completed, the articles are again placed in the oven, with a heat sufficient to fix the glazes, and this perfects the series of operations necessary to the formation and embellishment of a Watcombe vase. Success so signal having been attained in the minor and utilitarian objects, attention is now chiefly directed to ornamental composition and detail; and, in respect to flower and foliage reproductions, nothing that has ever been produced is at all comparable with the really marvellous productions of Watcombe in this department. The *chefs d'œuvre* of the manufacture, as yet, have been baskets of flowers, and they claim this distinction as setting forth the infinite *finesse* with which the clay may be worked; results far surpassing anything, either ancient or modern, that has been attempted in this way. Each leaf is separately modelled, and consigned to its place with an exactitude of form and precision of surface strictly imitative of nature in its minutest detail; and thus, with most perfect success, are modelled baskets of roses, passion-flowers, lilies, ferns, and indeed a variety embracing the entire circle of the picturesque Flora. Other remarkable works are statuettes of the Princess Louise, the Marquis of Lorne, the late Charles Dickens, &c., of which great numbers have been sold; and, conspicuously, a pair of vases, covered with jet glaze, and enriched with copies in gold of valuable sculptural works. We may also mention among the best reproductions of this establishment a bust of our Saviour by an eminent Belgian sculptor.—*Art Journal.*

The People's Theatre, St. Peter's-square, Stockport.—Some alterations have been made in this theatre. The whole of the work has been designed and executed by Mr. Peter Pierce. The plastering and cornices were done by Mr. E. Wilkes. One feature in the remodelling of the place is the lowering of the pit to the basement-floor, by which the effect on the interior is similar to what would be produced by adding another story to the building. The proscenium is thus heightened. The semi-circular top of the opening is finished with moulding to harmonise with the treatment of the walls generally. These will be contrasted with the colouring of the front of the galleries, from which the gaseliers project. What was formerly the floor is now cut away, except a portion running all round, which will form a dress circle, with 400 chairs, terminating at the stage-end on each side with private boxes. Instead of one gallery at the entrance-end, there will be one on each side, the whole of this portion now affording accommodation for 900 people. None of the Manchester theatres, it is said, have such wide staircases, and there are three wide doors for egress. Dressing-rooms are provided for the performers under the stage and behind it, the stage itself being considerably larger than heretofore.

Monumental.—The Cowper Memorial Committee of the Olney Mechanics' Institute, considering the present an appropriate time, have resolved, after securing the counsels and co-operation of the principal gentlemen of the town and neighbourhood, to proceed with the matter without further delay. It has been decided that the scheme shall include the purchase of a suitable site, the erection of a town-hall, with a statue of Cowper in front of it, and the formation of a public library in Olney.——The monument in honour of Jahn, the founder of the societies for athletic exercises in Germany (Turnvereine) after the disasters in 1806–7, has been erected and unveiled on the Haasenheide, near Berlin. A festive procession was formed, in which England, America, Austria, Hungary, and all parts of Germany were represented by deputations, and the streets were gaily decorated with flags, and densely thronged. The Minister of the Interior and the municipal authorities, in their official robes, assisted at the ceremony.

Sir George Gilbert Scott, R.A. — On Friday, the 9th inst., at Osborne, her Majesty conferred the honour of knighthood on our distinguished and esteemed colleague.

Bridges, Great Grimsby.—Two new bridges have been opened, connecting the new town with the old town, and both with the corporation land on the west side of the Old Dock. One of these is a foot-bridge, with a 6 ft. clear roadway, and a total length of 620 ft. It crosses the permanent way of the Manchester, Sheffield, and Lincolnshire Railway, and rests on thirty-two iron columns, each 16 ft. 6 in. long. It is approached by staircases rising from the footway at each end of the bridge, and it is the largest bridge yet constructed over any railway in this country. A swing bridge has been carried across the Old Dock, 283 ft. in length, with a roadway 16 ft. wide, and footpaths on each side, 4 ft. wide. It is in eight spans, one of which is movable, so as to allow vessels to pass to and fro in the dock and through a channel of 45 ft. clear width. It is formed of wrought-iron girders on cast-iron screw piles and cylinders. These bridges have cost about 12,000*l.* By the opening of the swing bridge over the dock, 240 acres of grass land, in close proximity to the town and docks, have been made available for a park, building, and other purposes. Excellent roads have been made through this land, and sites for above 200 new houses have already been bespoken.

Improved Dwellings for the Working Classes.—At the Mansion House, Alderman Sir Sydney Waterlow, the chairman, presided at the eighteenth half-yearly meeting of the Improved Industrial Dwellings Company. The report stated that the subscribed capital now amounted to 206,150*l.*, and the unallotted shares represented 43,850*l.* The loans from the Public Works Commissioners were to the amount of 84,000*l.* in all, of which 69,000*l.* had been received. The rents during the half-year had brought in 9,483*l.*, and the total expenditure was 5,294*l.*, leaving a profit of upwards of 4,000*l.* The directors recommended the payment of the usual dividend of 5 per cent., and that from the balance (5,332*l.*) a sum of 5,000*l.* should be placed to a reserve fund, and invested for the equalisation of dividends. The number of persons now occupying dwellings belonging to the company is 5,056,—viz., 2,675 above sixteen, and 2,381 children, while the number of different occupations was no less than 337.

The Drainage of Barnes.—The pressure on the parish authorities by the Thames Conservators has induced the vestry to appoint a committee, who, after a careful consideration of all the circumstances, suggest the adoption by the vestry of the following resolutions, viz.:—

"That the vestry of Barnes, recognising the necessity of providing, without further delay, for the proper and efficient drainage of the parish, adopts the system of sewers recommended by Messrs. Tress & Innes, subject to such modifications as may be found necessary when the position of the outfall is determined.

2. That the Special Drainage Committee be authorised to take such steps as may be necessary for obtaining the requisite permission from the Local Government Board for borrowing a sum not exceeding 8,000*l.* for the construction of the said system of sewers.

3. That the vestry are of opinion that it would not be desirable to establish local sewage works, and therefore request the Special Drainage Committee to take such steps as they may deem best in supporting and promoting a general scheme for providing an outfall for the sewage of the Thames Valley above the metropolitan district."

These resolutions have since been adopted by the vestry.

Vienna Exhibition. — It is proposed to organise, during the period of the coming universal Exhibition at Vienna, but separate from it, a special exhibition illustrative of the history of the city of Vienna. According to the *Society of Arts Journal*, this collection is to be divided into two groups—the first to include plans and views of the city, and of its various quarters and most interesting edifices, prints recording the most remarkable events that have occurred there, portraits of notable persons, and engravings illustrative of the habits, customs, and fashions of various periods; the second division to include monuments and other objects in stone, wood, and metal, historical products of Viennese industry, and medals referring to historical facts and personages of interest in connexion with the Austrian capital.

The Salt Memorial at Stafford.—It has been decided by the committee to open out the front of St. Chad's Church, and restore this edifice as a memorial. The contemplated improvements will necessitate the pulling down of the premises occupied by Messrs. Deakin, as well as others. Sir Gilbert Scott has been, or is to be, requested to furnish designs for the work.

The Steam-Whistle.—By the new Act, to use a steam-whistle is forbidden, provided the purpose be to summon workmen to labour. A whistle may not be blown nor a trumpet sounded with this object under a less penalty than 5*l.*, and a farther penalty of 40*s.* for every repetition of the offence. The nuisance on railway engines ought to have been dealt with also. It is a nuisance quite as unbearable as that for which Parliament has thought fit to legislate, and it is one which might be materially modified without Parliament's intervention. In the United States, the sound of railway whistles resembles the low note of a Chinese gong, and is neither unpleasant nor unmelodious. If our railway directors would only take a lesson from our American brethren in this matter they would merit the thanks of the community. If not, then the Act against fixed steam-whistles will be made to include movable ones also. The new law will be used as a precedent, and will furnish an argument of irresistible force.

A New Gas Igniter.—Various experiments of an effective and successful character, it is said, have been made in Preston, with the view of testing a new gas-igniter, discovered at the Royal Observatory of Gottingen, in Hanover, and adopted and successfully used in the principal street of that city since last Easter, and about to be applied to 10,000 street lamps in Berlin, by order of the Imperial Government. Mr. J. Billington Booth, of Preston, has patented the apparatus for England. The chief peculiarity of the invention is said to be this,—that with the utmost ease, rapidity, and certainty it can (without the personal application of heat or flame) ignite gas simultaneously in any number of lamps, globes, or burners, at any distance or altitude, and simply by the gas-pressure laid on, and acting on a chemical material and apparatus easily applied beforehand to the burners.

The Science College for Birmingham.—The arrangements for carrying out Mr. Josiah Mason's munificent intention to found a science college in Birmingham, specially fitted to the wants of the town and of the district around it, are progressing. An excellent site for the college has been purchased by Mr. Mason, in Edmund-street, at the back of the town-hall; and a provision has been made by way of endowment for the institution. Mr. Mason has now, we understand, completed the number of his trustees. The gentlemen upon whom this honour has been conferred are Dr. Blake and Mr. G. J. Johnson (the two trustees originally appointed), Mr. W. C. Aitkin and Mr. J. Thackeray Bunce (whose names were appended to the foundation deed as witnesses to Mr. Masons' signature), and Dr. Heslop and Mr. George Shaw.

Carlisle Public Hall.—The prospectus of this new Public Hall Company (Limited), has appeared in the local *Journal*. The capital is 8,000*l.* in 1,600 shares of 5*l.* each. It is not purposed to expend the whole at once. The site is at the corner of Lowther-street and Chapel-street, and is 2,600 square yards in extent. The cost will be 10*s.* a yard. Steps will be taken towards the erection as soon as the conveyance is executed. The building will comprise a large public room, capable of seating from 1,500 to 2,000 people, a smaller room for sales and such like purposes, two shops, offices, outbuildings, custodian's room, &c. The committee estimate that if the hall be erected at a cost of 5,000*l.* or 6,000*l.*, it will realise a dividend of not less than 7½ per cent.

Instruction in Physics.—The Lords of the Committee of Council on Education have decided to transfer the instruction in physics, chemistry, and natural history from the Royal School of Mines in Jermyn-street, and the College of Chemistry in Oxford-street, to the new buildings in Exhibition-road, South Kensington. The following courses of lectures and practical laboratory instruction will be given at South Kensington:—Chemistry, by Professor Frankland; biology, by Professor Huxley; physics, by Professor Frederick Guthrie, with laboratory work.

Sussex Archæological Society's Meeting. The annual meeting of this society was held on Thursday in last week, at Parham House, the residence of Lord Zouche. Notwithstanding the threatening appearance of the weather, there was a good attendance of members and their friends. The dinner took place in the society's marquee, in Parham Park.

Laying the Foundation-stone of a Leeds Board School.—The foundation-stone of the first of the Board schools to be erected by the Leeds School Board, under the Elementary Education Act, has been laid, on the site of the intended building, in Bewerley-street Dewsbury-road. Mr. G. Corson is the architect. The school will accommodate 854 children, allowing 10 superficial feet of floor space to each child. The cost of the main building will be 5,834*l.* 1s. 1d.; the covered playgrounds and fences, 2,669*l.* 19s. 6d.; and the contingent expenses,—such as architects' fees, &c., will amount to 455*l.*; making a total of 8,989*l.* 0s. 7d. The site has been purchased from Lord Houghton, at a cost, including the half of the streets, of 1,333*l.* 2s. 6d.

Bursting of the Lake, near Petersfield, Godalming.—During one of the recent extraordinary thunderstorms, it appears that a waterspout fell in the forest, and rushed in an immense stream of 120 ft. to 150 ft. wide, and 6 ft. high, into the lake, making the water rebound over the embankment, and then away it went, from top to bottom, and one huge volume of water poured out, sweeping trees, stones, and everything before it. Independent of the waterspout, the rain has done incalculable damage, loads upon loads of earth having been washed out of the fields, and the roads being left like skeletons, earth and sand all gone, and only the bare stones left, large holes washed out, and banks thrown down. An express train had a very narrow escape.

The New Dock at North End, Liverpool. A considerable addition has just been made to the Liverpool Dock Estate, by the construction of a new dock at Bootle, for steam purposes. It is situated immediately to the north of the Huskisson Branch Dock, and forms an integral portion of the Huskisson Dock. The new dock is 1,200 ft. in length by 300 ft. wide, and extends over 8 acres in area, having about 2,700 ft. of quay space. It will be seen from these dimensions that the Huskisson Branch Dock No. 2, which is its name, is peculiarly formed, being long and narrow, and therefore specially adapted for the use of steam vessels.

London Financial Association.—At the half-yearly meeting of shareholders in the London Financial Association, the chairman said one of the principal assets was the Muswell-hill property, and the directors had come to the conclusion that it would be useless to attempt to sell that palace and property to any company in an unfinished state, and therefore they had determined to complete it. Everything was now being pushed forward with vigour, and the board had determined to postpone the opening of the palace until next spring, by which time the short railway would be completed. Over this line would pass the whole of the traffic from the Metropolitan and other systems, and take visitors direct to the palace.

Offer of Paintings to Town Councils.—The Newport (Isle of Wight) Council have received a letter from Mr. Vivian Webber, of Ryde, offering to present the corporation with a painting,—a memorial picture, having reference to the recovery of the Prince of Wales. Mr. Webber has presented some pictures to the corporation of Ryde. The corporations have accepted with thanks his generous offer. The picture for Newport is 14 ft. by 7 ft., including the frame, and it is said to be a valuable art-work.

Masters and Workmen.—The Act to make further provision for arbitration between masters and servants (35 & 36 Vict., cap. 46) is issued. It recites the Act, 5 Geo. IV., cap. 96, in which provision was made for the arbitration, in a mode therein prescribed, of certain disputes between masters and workmen. Provisions are now made with reference to agreements under the Act. An agreement is to designate some Board, Council, or persons as arbitrators.

The Leeds Exchange and News Room.—Mr. Nussey, chairman of the Exchange and News Room Committee, has received a letter from Lieut.-colonel Sir Howard Elphinstone, stating that his Royal Highness Prince Arthur will have the pleasure of laying the foundation-stone on Friday, the 20th of September.

St. Peter's at Rome.—The *Fanfulla* states that the cupola of St. Peter's shows unmistakable signs of decay. A commission of Papal architects and engineers has, it is said, been appointed to examine it.

Proposed Testimonial.—A movement has been started for the purpose of presenting a testimonial to Mr. George Smith, of Coalville, near Leicester, who has laboured to ameliorate the condition of the women and children employed in brickfields. We were earlier in the (brick) field than even Mr. Smith, but, for all that, we shall be glad to hear of his receiving a testimonial, if he desires one.

Testimonial to Mr. H. G. Blagrove.—The printed record of subscriptions, &c., for behoof of Mr. Blagrove, the distinguished violinist, whose continued illness has disabled him from carrying on his profession, is a good example of what may be done in such a case. A sum of 1,500*l.* odd has been collected, and a Government annuity of 100*l.* thereby secured to Mr. Blagrove for life by an active committee of sympathisers.

Sunday Street Watering.—The Street Cleansing and Sanitary Committee of the Westminster District Board of Works have reported that they have directed the principal thoroughfares of the district to be watered on Sundays during the driest portion of the season, the contractor for the horse hire having agreed to supply horses at the contract price for such purpose.

The Camberwell New Vestry-hall.—The chief stone of this new edifice, a view and plan of which we gave on the 13th of April last, has at length been laid by the chairman of the vestry, Mr. Turney. The site chosen for the building is that formerly occupied by Havil House, at the corner of Havil-street, High-street, Peckham.

The Bristol City Surveyorship.—After a long discussion, the city council have at length resolved, by 32 to 17, to appoint a city surveyor and architect, but not to require him to give his whole services to the city; and the committee are to ascertain what terms can be made with Mr. Josiah Thomas.

Seats in Public Places.—Mr. W. H. Smith, M.P. for Westminster, has intimated to the Metropolitan Board of Works his willingness to be at the expense of placing twenty seats upon the Victoria Embankment for the public accommodation. It is to be hoped that this kindly act will be emulated by other generous persons.

Sherston, Wilts.—Messrs. J. Davenport & Co., of Derby, are about to erect a new silk factory, chimney-shaft, engine and boiler-house, &c., at Sherston, Wilts. It will be about 170 ft. long and about 70 ft. wide, and lighted by sky-lights. Mr. Charles Brown, of Tetbury, is the contractor.

Ventilation of Sewers.—The Limehouse Board of Works report the placing of twenty-six ventilating shafts in Poplar, and of thirteen in Limehouse and Ratcliff, in connexion also with apparatus for deodorising the effluvium from the sewers by means of sulphuric acid instead of charcoal.

New Theatre in Vienna.—A new theatre is to be built in Vienna for the Exhibition season of next year. There will be room for 5,000 spectators in the auditorium. The director is to be Baron Schwartz.

A New Theatre for Cardiff.—It is proposed to erect a theatre on the Circus site. The new edifice, drawings of which have been prepared, will also serve the purpose of a Philharmonic Hall.

The Wallace Fountains for Paris.—The first of the drinking-fountains due to the liberality of Sir Richard Wallace has just been erected on the Boulevard du Combat, at La Villette, near the Rue des Buttes Chaumont.

TENDERS

For taking down and rebuilding Nos. 43 and 44, Upper Berkeley-street, Portman-square, for Mr. W. H. Hudson. Mr. Alfred Wright, architect. Quantities supplied:—

Sharpington & Cole	£2,929	0	0
Brown	2,840	0	0
Temple & Forster	2,675	0	0
Harris & Sons	2,659	0	0

For the completion of two houses at Silverdale, Sydenham:—

Parkes	£1,024	0	0
Winter	955	0	0
Creba	925	10	0
Huff	925	0	0
Bysh	925	0	0
Beach	890	0	0

For enlargement of Beulah-road Schools, for Croydon School Board. Mr. Charles Rutley, architect. Quantities by Mr. Ough:—

Fanthorpe	£1,572	0	0
Holmes	1,354	0	0
Ockenden	1,330	0	0
Alen	1,275	0	0
Wales	1,270	0	0
Ward	1,245	0	0
Nightingale	1,177	0	0
Johnson	1,158	0	0
Wright & Co.	1,149	0	0
Warr	1,148	0	0
Masters	1,147	0	0
Spearing	1,113	0	0
Waterson & Co.	1,098	0	0
Preskett & Taylor	1,080	0	0
Coles	1,062	0	0
Hearle	997	0	0
Crook & Wall	975	0	0
Mason & Bristy	926	0	0

For Town-hall, Holywood, co. Down. Mr. William Batt, jun., architect:—

Nimick (accepted)	£1,580	0	0

For additions and alterations to Glebe House, Holywood, co. Down. Mr. William Batt, jun., architect:—

Colville	£1,795	0	0
J. & J. Guiler	1,650	0	0
Lowry & Son	1,540	0	0
Moore	1,470	0	0
Rowley & Mansell	1,450	0	0
J. & R. Thompson	1,300	0	0
Nimick (accepted)	1,248	0	0
Moore & Son	1,245	0	0

For new brewery and maltings at Orwell, near Royston. Mr. George Scamell, architect. Quantities by Messrs. Curtis & Son:—

Coles, Brothers	£10,550	0	0
Bell & Sons	9,830	0	0
Dove, Brothers	9,275	0	0
Brown (accepted)	9,160	0	0

For new house and stables, Kingston-hill, Surrey. Messrs. F. & H. Francis, architects:—

Myers	£5,419	0	0
Dove	5,375	0	0
Colls & Son	5,170	0	0
Fish	5,150	0	0
Gibson	4,793	0	0
Hurst	4,750	0	0

For St. Saviour's Church, Northumberland-street, Poplar. Messrs. F. & H. Francis, architects:—

Sheffield	£7,649	0	0
Gibson	7,171	0	0
Kiddall	6,928	0	0
Abraham	6,798	0	0
Myers	6,729	0	0
Howard	6,705	0	0
Dove	6,455	0	0
Watts	5,995	0	0
Wicks, Bangs, & Co.	5,795	0	0

For the erection of new school-buildings and teachers' residence, at Marloes, Pembrokeshire. Cost of walling-stone and hauling not included. Mr. E. H. Lingen Barker, architect:—

Davies & Puton	£760	0	0
Davies	723	19	4
Morgan	677	9	0
Lewis	675	10	0
Edwards	670	0	0

For the erection of house and coal-store, Broadstairs Gasworks:—

Harrison	£740	0	0
Elgar	739	0	0
Howlet	575	0	0
Horne	575	0	0
Hayward	560	0	0
Stark (accepted)	554	15	0
Hillier	525	7	6

For additions and alterations at 10, Moorgate-street, for the Council of Foreign Bondholders. Mr. E. A. Gruning, architect. Quantities supplied by Mr. C. H. Goode:—

Myers	£4,074	0	0
Thompson	3,997	0	0
Foster	3,898	0	0
Henshaw	3,882	0	0
Adamson	3,838	0	0
Oliver	3,773	0	0

For schools, Mary-street, Bromley, for the School Board for London. Mr. Lacy W. Ridge, architect. Quantities supplied by Mr. L. C. Riddett:—

Nixon & Son	£6,700	0	0
Sheffield	6,500	0	0
Brass	6,359	0	0
Higgs	6,350	0	0
Killby	6,183	0	0
Williams & Son	6,117	0	0
Scrivener & White	5,745	0	0
Cooke & Green	5,698	0	0
Nightingale	5,578	0	0

For building house at Barnsbury, for Mr. Bradsell. Mr. W. Smith, architect:—

Cooke & Groome (accepted)	£335	0	0

For building villa at Arkwright-road, Hampstead, for Mr. J. Stuart. Mr. V. K. Green, architect:—

Cooke & Groome (accepted)	£2,060	0	0

For alteration and additions at the Cherry Orchard, Charlton, Kent, for Mr. T. W. Powell. Mr. A. Payne, architect:—

Cooke & Groome (accepted)	£1,760	0	0

All Saints', Hertford.—It will be obvious that Mr. Norris's tender should be 680*l.*; not, as misprinted, 180*l.*

TO CORRESPONDENTS.

G. W. B. (there *is* a drill in which diamonds are made use of).—L. O. W. (a surveyor who is paid for taking out quantities would be liable if they were found grossly incorrect. A verbal intimation that the contractor must satisfy himself as to their correctness, would not get rid of this liability. Any person may take out quantities and charge for them).—J. B. S. (no other machines are in the market. A machine differing from those patented could be made without fear).—B. N. & W. (under our mark).—T. T. G. (send us particulars of the machine).—H. G. B. (such information is usually given by advertisement, which should be looked for. If plan is good, send it to us).—J. H. S.—C. H. G.—C. H.—G. S.—L. C. R.—M. E.—W. B.—H. & Co. W.—C. I.—J. V.—B. M. H.—Mr. H.—C. & Son.—C. B.—W. R.—Secretary of Aquarium.—B. B.—W. H. E.—J. C.—E. H.—E. A. H.

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

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AN experienced and energetic Man is open to an ENGAGEMENT as SHOP FOREMAN or otherwise, or as Foreman on a large Estate. Accustomed to let piecework, &c. Joiner by trade. References if required.—Address, X. 12, Shirland-road, Maida-hill, Paddington,

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A GENTLEMAN, of twenty years' good practical experience, wishes an ENGAGEMENT, for the whole or portion of his time, where draughtsmanship is of minor importance. Address, No. 656, Office of "The Builder."

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A MANAGING ASSISTANT, or Other-wise, who is now fulfilling an engagement of responsibility, will be DISENGAGED in a few days. He has had eighteen years' experience in every branch of the profession, including specifications, quantities, measurement, correspondence, &c. — Address, H. W. No. 45, Horsefair, Doncaster.

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FACING, MOULDED, CULVERT, CHANNEL, GROOVED, STABLE, and DIAMOND PAVING BRICKS,
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SPRING-GROVE BRICKFIELDS, near HOUNSLOW, MIDDLESEX, S.W.—H. KYEZOR (sole successor to A. E. Burchett) begs to inform Builders and Contractors that he can supply them with any quantity of best bright STOCK and other BRICKS at greatly reduced prices. The nearest Brickfields to Richmond, Kew, Mortlake, Petersham, Turnham-green, Ealing, Brentford, Isleworth, Hounslow, Twickenham, Hampton, Teddington, Kingston, &c. Cart entrance to the fields, directly opposite the Isleworth Station of South-Western Railway.—Office, Caswell Cottage, nearly opposite the ninth milestone, London-road, Hounslow.

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N.B—Can be put into barges alongside the field. Prices very reasonable.

PURSUANT to a Decree of the High Court of Chancery, made in a cause COOK against MOY, all persons claiming to be creditors of JOSEPH HARPER, late of Harper's-place, Vauxhall Bridge-road, Westminster, in the county of Middlesex, builder (who died in or about the month of February, 1871), under an indenture bearing date the 14th day of February, 1851, and made between the said Joseph Harper of the first part, David Kennett of the second part, John Moy and the said David Kennett of the third part, and the several other persons whose names are mentioned in the schedule thereunder written of the fourth part, are on or before the 1st. day of OCTOBER, 1872, to send by post, prepaid, to OCTAVIUS MARCH, Esq. of the firm of Messrs. Graham & March, of 26, Charles-street, St. James's-square, in the county of Middlesex, the Solicitors of JOHN MOY, the surviving trustee of the said indenture, their Christian and Surnames, addresses and descriptions; the full particulars of their claims; a statement of their accounts, and the nature of the securities (if any) held by them; or, in default thereof, they will be peremptorily excluded from the benefit of the said decree. Every creditor holding any security is to produce the same before the Master of the Rolls, at his Chambers, situated in the Rolls Yard, Chancery-lane, Middlesex, on FRIDAY, the 1st day of NOVEMBER, 1872, at ELEVEN o'clock in the forenoon, being the time appointed for adjudicating on the claims. Dated this 9th day of August, 1872.

E. B. CHURCH, Chief Clerk.

MACKESON, TAYLOR, & ARNOULD,
59, Lincoln's-inn-fields, Plaintiff's Solicitors.